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Empirical Analysis of Human Capital, Learning Culture, and Knowledge Management as Antecedents to Organizational Performance: Theoretical and Practical Implications for Logistics Readiness Officer Force Development

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EMPIRICAL ANALYSIS OF HUMAN CAPITAL, LEARNING CULTURE, AND KNOWLEDGE MANAGEMENT AS ANTECEDENTS TO ORGANIZATIONAL PERFORMANCE: THEORETICAL AND PRACTICAL IMPLICATIONS FOR LOGISTICS READINESS OFFICER FORCE DEVELOPMENT

THESIS

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Abstract

The ubiquitous nature of economic uncertainty that has plagued the Department of Defense has necessitated the relentless pursuit of cost savings and efficiency improvements. Under the auspices of force development, drawing on resource-based theory, this research analyzed the impact of Logistics Readiness Officer (LRO) human capital, learning culture, and knowledge management on organizational performance as a means to increase competitive advantage. Survey methodology was utilized to garner data with both theoretical and practical implications on LRO force development practices. Solicitation of information regarding LRO competencies, the utility of logistics courses, and the latent constructs was conducted via a web-based self-reporting cross-sectional survey. Data were collected from 617 LROs out of a possible 1,411, yielding a 43.7% response rate.

Examination of the latent variable data using multivariate regression supported all three hypotheses, revealing that investment in LRO human capital, learning culture, and knowledge management have positive impacts on organizational performance. Practical application of the theoretical findings could yield potential cost savings of between $6K and $60K per course per annum by consolidating or restructuring each logistics course identified as having low utility. Implications for researchers and practitioners are discussed along with limitations, recommendations, and areas for future research.

Acknowledgments

I would like to thank my research sponsors, Maj Gen John Cooper and Lt Col Eric Ellmyer, for providing me the latitude to explore the domain of LRO force development. I would also like to thank my research advisor, Lt Col Joseph Skipper, for his guidance and trust throughout this endeavor. His persistent involvement and pointed questions drove me to think critically and push the boundaries of my own capabilities. A similar thanks goes out to my reader, Maj Robert Overstreet, for helping solidify the direction of my research. The efforts of my research committee were pivotal in the completion of this venture.

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I. Introduction

Background

Fiscal constraints and an environment of economic instability have necessitated only the most pointed and prudent financial decisions. Chief among these important financial decisions is how best for the United States (US) government to use taxpayer money. As a result of the recent sequestration, the Department of Defense (DoD) has had economic constraints imposed on each of the military services impacting every aspect of their US Code Title 10 missions. The Air Force is not exempt from these fiscal burdens and must find creative ways to relieve the pressure imposed by these challenges whilst continuing to fly, fight, and win without fail. The Air Force Chief of Staff recognized this fact when he said in his recently released Air Force Vision Statement, "Faced with fiscal challenges, we must make prudent choices to ensure that the Air Force is able to release the full potential of airpower" (Welsh, 2013). General Welsh encouraged Airmen to take risks, make decisions, and learn from their mistakes.

Human capital investments are an easy target of financial relief, as evidenced by the continuous effort to ensure a rightly sized and utilized Air Force through force management programs and policies. Much of the DoD's force shaping problems in the active duty military stem from the way in which it chose to absorb the force reductions at the end of the Cold War. The DoD gave priority to achieving voluntary reductions and

reducing new accessions. The DoD's military and civilian workforces peaked in fiscal year 2011 at 3.1 million personnel, and is projected to decrease over the next five years to below the fiscal year 2001 level of 2.9 million (US Government Accountability Office, 2013). Federal human capital strategies are not appropriately constituted to adequately meet current and emerging needs of government and its citizens in the most effective, efficient, and economical manner possible (US Government Accountability Office, 2009). The GAO has emphasized human capital challenges across the government in four key areas:

- Strategic human capital planning and organizational alignment
- Leadership continuity and succession planning
- Acquiring and developing staffs whose size, skills, and deployment meet agency needs, and
- Creating results oriented organizational cultures (US Government Accountability Office, 2009)

Specific strategic human capital planning included integrating succession planning and management efforts that focused on strengthening organizational capacity to obtain or develop the knowledge, skills, and abilities (KSAs) agencies needed to meet their missions (US Government Accountability Office, 2009). In the 2008 DoD Logistics Human Capital Strategy (HCS) the Deputy Undersecretary of Defense for Logistics and Materiel Readiness stated:

> "It is imperative that the logistics workforce align its human capital with transformed warfighting, modernized weapons systems, business rules, emerging enterprise management systems, and executive-level strategic goals. The community should also be grounded in teamwork and collaboration; ultimately, all logisticians across the enterprise would view one another as partners and contributors willing to support each other to achieve mission accomplishment."
>
> Office of the Secretary of Defense (2008)

The Air Force Logistics Force Development Division (AF/A4LF) is charged with providing education and training strategy for Air Force logisticians, comprised of Aircraft Maintenance Officers (21A), Munitions Maintenance Officers (21M), and Logistics Readiness Officers (LRO). Essentially, A4LF is challenged with managing Air Force logisticians' logistics knowledge through force development. Force development is a deliberate process of preparing Airmen through the Continuum of Learning (CoL) with the required competencies to meet challenges of the 21st century (Department of the Air Force, 2011). As an operational doctrine concept, force development helps guide the proper employment of air, space, and cyberspace forces and is used to build leaders (Department of the Air Force, 2011). The CoL combines education, training, and experience to produce the right expertise and competence to meet the Air Force's operational needs (Department of the Air Force, 2011).

Knowledge management has been described as a source of competitive advantage (McInerney and Koenig, 2011; Hult, et al., 2005) in civilian settings with recognition that knowledge is critical to a firm's long-term success (Kiessling, et al., 2009). The applicability, importance, and implications of knowledge and knowledge management practices in the military should not be overlooked. Furthermore, knowledge, as a strategically significant resource (Kiessling, et al., 2009), should be utilized to the fullest extent possible. Professional continuing education (PCE) courses are one of the primary methods of distributing knowledge to Air Force logisticians. PCE is defined as any course that is less than 20 weeks in duration and satisfies mission accomplishment, sustainment, or enhancement as required by law, Air Force governance, specific memorandum of agreement, or position requirement (Department of the Air Force, 2011).

A particularly challenging and important task for the AF/A4LF office is to align logistics education and training strategies with DoD Logistics HCS objectives. The DoD Logistics HCS calls for an integrated, agile, and high-performing future workforce of multi-faceted, interchangeable logisticians that succeed in a joint operating environment (Office of the Secretary of Defense, 2008). To achieve this, A4LF must work toward a competency-based logistics workforce by providing a logistics career roadmap with a common lexicon of core logistics competencies and proficiencies (Office of the Secretary of Defense, 2008).

Current logistics officer education and training is disjointed and faces many obstacles that must be overcome to successfully provide Air Force logisticians with the roadmap prescribed in the DoD Logistics HCS and the CoL described in Air Force doctrine. The force development team at the pentagon is aware of the challenges ahead as they have recognized the need for thoughtful and deliberate education and training of Air Force logistics officers and are actively engaged in mitigating these challenges. Cultivating a culture that values learning will enable A4LF to meet these challenges head on.

A 2011 review of Air Force education and training practices revealed that logistics officers attended more than 200 different DoD funded logistics courses; 90 of which were funded by the Air Force. A brief examination of these courses discovered that many of these courses taught overlapping logistics concepts and therefore led to overwhelming inefficiencies in logistics officer development (Cooper, 2012). To improve the efficiency of logistics officer force development the Air Force must improve the return on investment obtained from educating and training logistics officers by

providing what A4LF calls a Deliberate Continuum of Learning (DCoL). It is not enough to arbitrarily send an officer to logistics courses when they become available. Opportunities to attend logistics courses should be carefully allocated to the officer that fits in to the long-term strategic objectives of the Air Force. Appropriate consideration must be given to ensuring officers are properly vectored by developmental teams (DT) and placed in positions that will best utilize their KSAs in order to pay short and long run dividends to the Air Force. Properly forecasting human capital requirements at the tactical, operational, and strategic levels, for specific competencies and proficiency levels is essential to meeting the goals of the Logistics HCS and the DCoL.

A 2001 Government Accountability Office (GAO) report remarked that leaders in the DoD have no institution-wide process for systematically examining future human resource needs or for translating those needs into a coherent strategy that support DoD's overall strategic plan (US Government Accountability Office, 2001). In order to address this issue an assessment needs to be conducted to determine when logistics officers should receive appropriate education and training as they progress throughout their careers so they can be postured for certain key positions. Studies have been conducted to determine 'what' an Air Force logistician needs to know (e.g. Roberts, 2013; Thompson, 2013) but exactly 'when' and 'how well' are topics yet to be fully explored and emphasized.

Problem statement

Air Force logistics officers have many opportunities throughout their career for professional development to hone or build upon their KSAs through force development

initiatives. The logistics officer community as a whole lacks a clear career path that outlines and prescribes the appropriate logistics courses required in various jobs to successfully manage the Air Force's logistics enterprise and perform in a joint logistics environment. Specifically, the LRO career field is without a clear understanding of how force development practices influence organizational performance. Achieving competitive advantage and a substantial return on investment with the DCoL initiative will require exceptional human capital and knowledge management practices, a culture that values learning, and exploration into the methodical programming of logistics officers' education and training.

Research Objectives/Investigative Questions

Given this problem, there is a basic need to pinpoint what types of jobs LROs are currently holding and how proficient they need to be in various competencies. Also, current logistics courses offered to LROs need to be identified, along with their perceived usefulness. Furthermore, determining the relationship between the learning organization, human capital, and knowledge management of LROs and perceived organizational performance will enable better force development practices. To address the objectives of this thesis, seven Investigative Questions (IQ) were posed:

IQ1: What is the relationship between the learning organization, human capital, and knowledge management of LROs and organizational performance?
IQ2: What are the competencies for which LROs require proficiency?
IQ3: How proficient do LROs need to be in logistics competencies for them to do their jobs?
IQ4: What are the current Air Force logistics centric course offerings?
IQ5: What courses have allowed LROs to perform their current jobs better?
IQ6: Among the courses that LROs have not taken, which courses do LROs feel would have allowed them to perform their current jobs better?
IQ7: How do LROs classify their duties (tactical, operational, strategic)?

Research Focus

This study will focus on the deliberate education and training of LROs. The sponsor for this research is AF/A4L, Director of Logistics at the Pentagon. This office is responsible for organizing, training, equipping, and ensuring the readiness of Air Force logistics officers. An interpretation made by the researcher is that this office is responsible for logistics officer knowledge management, influences logistics officer learning culture, and largely dictates how logistics officer human capital is utilized as a strategic resource.

Methodology

Surveys are a good way to reach a large number of people at a lower cost than other qualitative and quantitative methods. This research utilized a cross-sectional survey to assess perceptions of LROs and to build upon existing theoretical bases as they related to LROs. The appropriate survey technique for this research was a web-based self-administered survey. Web-based surveys provide capabilities far beyond those available for any other type of self-administered questionnaire as well as provide efficiencies not seen in other methods (Dillman, 2007). Specifically, web-based surveys have significant advantages over other methods in terms of response rates and cost (Cobanoglu, et al., 2001).

Assumptions and Limitations

The exploratory nature of this study lends itself to a couple of underlying assumptions. First, the assumption is made that the sample of LROs who responded to the survey is representative of the LRO population. This assumption may enable

generalizable statements to be made about the nature of LRO education and training. The second assumption is that the competencies identified by AF/A4LF encompass the range of KSAs required by LROs in today's dynamic logistics environment. This assumption will provide an anchor for how survey questions are developed and a baseline to which other guidance on competencies, or competency equivalents, are compared.

This study also includes some fundamental limitations. Because the intent of this study is to survey only active duty LROs the applicability to the other Air Force logistics officers, and the guard or reserve components may be limited. Inherently, the results of this study may not be generalizable across other military services and may not be transferrable to other career fields or the civilian logistics and supply chain management industry. However, this study may provide insights that will prove useful in analyzing other logistics specialties, career fields, or even military services and civilian industries. Additionally, LROs who are deployed at the time the survey was sent out may not have been able to respond, either because of the nature of their deployed mission, or because of some other obstruction. Furthermore, because this study was performed in a cross-sectional manner, as time passes the findings and results will become less and less relevant to the dynamic logistics workforce.

Implications

Results of this study will be used as a major component of A4LF's DCoL efforts. Research conducted by Captains Matt Roberts and David Thompson in 2012 concluded that there is a core set of KSAs that all logistics officers should learn. The focus groups used by Thompson and Roberts identified 63 parent KSAs for 21A officers and 60 parent

KSAs for LROs (Thompson, 2012; Roberts, 2012). More discussion of their studies will be provided in Chapter 2. This research expounds upon and complements the results of their findings, which have been used to assist in A4LF's logistics officer development initiatives (Roberts, 2012). The outcomes of this study can be used to aid LRO Developmental Teams (DT) (comprised of Colonels) in their effort to deliberately vector LROs and effectively manage their knowledge. DTs play a critical role in developing officers to support current and projected mission capabilities (Department of the Air Force, 2011). A major responsibility of the DT is to identify the education, training, and experiences appropriate for officers based on current and future requirements (Department of the Air Force, 2011). Coupled with career planning diagrams, the DT can use this information to make fiscally responsible decisions regarding Air Force human capital investments and provide LROs with a predictable framework to develop their own careers. The results of this study can be a step toward ensuring the Air Force receives adequate return on investment from sending LROs to logistics education and training courses. Finally, senior Air Force logisticians will be able to understand the relationship between LRO human capital, learning culture, and knowledge management practices, and organizational performance. Understanding these relationships will provide senior leaders valuable information that can be used for better career field-wide force development initiatives.

In addition to the implications for military logistics officers, this study is also relevant to leaders and researchers interested in the development of human capital, knowledge management, and the concept of the learning organization. Civilian logistics

and supply chain management professionals can perhaps use this information to make smart choices about their education and training programs and initiatives.

II. Literature Review

Overview

This chapter synthesizes the resource-based view of the firm, human capital theory, the concept of the learning organization, knowledge management, and organizational performance to build the relationship depicted in the theoretical model. Competencies, proficiencies and KSAs are also discussed to highlight the differences between various sources of guidance and to provide an assessment of how the civilian industry views these terms in a logistics context. Few studies have linked exact competencies, proficiencies, and KSAs to jobs in either military or civilian settings, but several studies have highlighted what competencies are desired in certain settings and fields. Discussion is also given to the typical billets LROs fill and the various logistics courses that are available to them. This information will be used for methodological considerations and development.

Resource Based View (RBV)

The RBV of the firm implies that an organization utilizes its resources to achieve sustainable competitive advantage against its competitors. Resources, as defined by Barney and Arikan (2001), are the tangible and intangible assets firms use to conceive and implement their strategies. A strategy is a firm's theory of how it can gain superior performance in the markets within which it operates (Barney and Arikan, 2001). Four attributes are said to give resources their unique competitive advantage abilities; resources must be valuable, rare, imitable, and non-substitutable (e.g. Barney, 1991; Yew Wong and Karia, 2010; Colbert, 2004). Resources are said to be valuable when they

enable a firm to conceive or implement strategies that improve its efficiency and effectiveness (Barney, 1991). Valuable firm resources possessed by a large number of competitors or potentially competing firms cannot be sources of sustained competitive advantage. Some strategies require a particular mix of physical capital, human capital, and organizational capital resources to implement, and they must be sufficiently rare to be a source of competitive advantage (Barney, 1991). Inimitable resources are those resources that are specifically difficult to imitate. Firms cannot achieve competitive advantage if their competitors are easily able to duplicate strategic resources. Firms attempting to imitate must also be faced with sufficient ambiguity for the resource-leveraging firm to achieve competitive advantage (Barney, 1991). The final requirement for a firm's resource to be a source of sustained competitive advantage is that there must be no strategically equivalent valuable resources that can act as substitutes (Barney, 1991).

In his article, Grant (1991) describes a framework for a resource-based approach to strategy formulation. Rather than solely focusing on the attributes of resources, Grant focuses on the missing gap between strategy and the firm's resources. Strategy formulation involves a five step procedure: analyzing the firm's resource-base; appraising the firm's capabilities; selecting a strategy; and extending and upgrading the firm's pool of resources and capabilities (Grant, 1991). The figure below depicts this framework. A distinction must be made between resources and capabilities. Resources are inputs into the production process while a capability is the capacity for a team of resources to perform some task or activity. While resources are the source of a firm's capabilities, capabilities are the main source of a firm's competitive advantage (Grant, 1991).

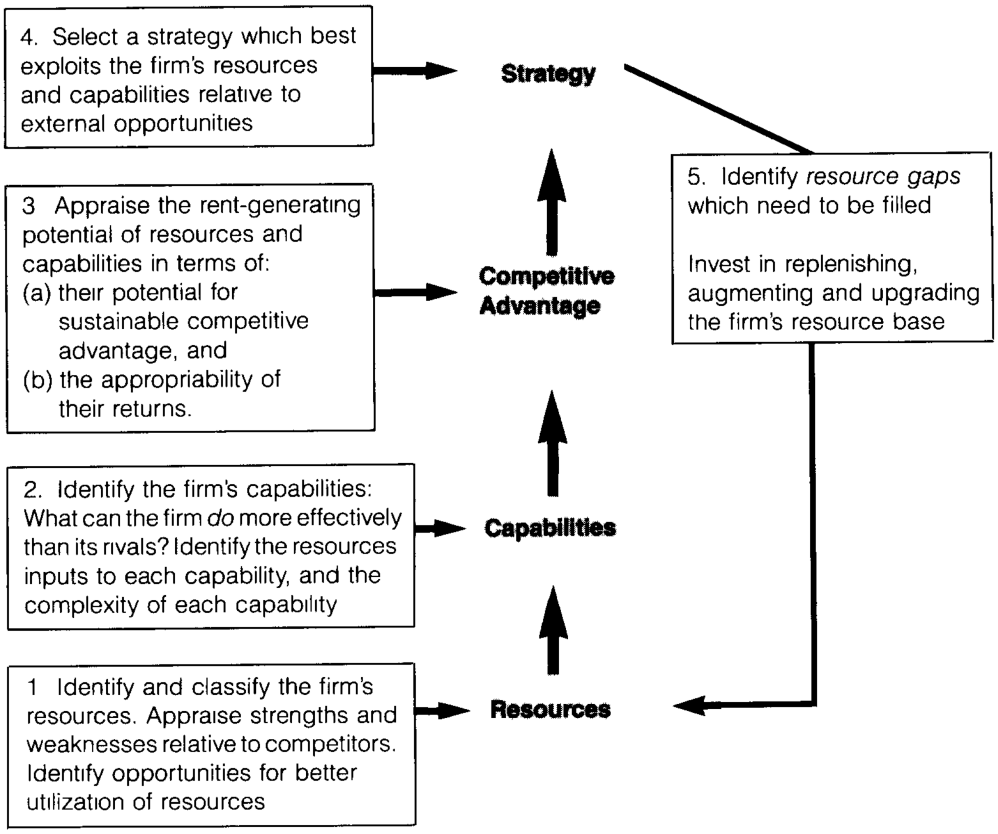

Figure 1: A Resource-Based Approach to Strategy Analysis:
A Practical Framework (Grant, 1991)

According to this framework a firm's most important resources and capabilities are those which are durable, difficult to identify and understand, imperfectly transferable, not easily replicated, and in which the firm possesses clear ownership and control. Grant calls these resource traits the firm's "crown jewels", which are described as resource attributes in similar studies (Wright, et al., 2001; Hatch and Dyer, 2004; Colbert, 2004). An effective strategy makes the most effective use of core resources and capabilities to achieve competitive advantage (Grant, 2001).

Barney (1991) provides a distinction between competitive advantage and sustained competitive advantage. A firm is said to have a competitive advantage when it

is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors (Barney, 1991). A firm is said to have a *sustained* competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors *and* when these other firms are unable to duplicate the benefits of this strategy (Barney, 1991). Essentially, whether or not a competitive advantage is sustained depends upon the possibility of competitive duplication. Most literature supports the notion that resources must be valuable, rare, inimitable, and non-substitutable, which implies that other firms are not able to duplicate these strategic resources (Barney, 1991).

Yew Wong and Karia (2010) extend Barney's work by adopting a theoretical framework in which firms (logistics service providers (LSPs)) make use of resources. It is argued that resources are not of much use by themselves and instead of merely possessing resources, firms must process them to make them useful (Yew Wong and Karia, 2010). "Resource possession" is different than "resource exploitation" (Barney and Arikan, 2001; Priem and Butler, 2001). Yew Wong and Karia (2010) performed content analysis on 15 large-profit global LSPs. Five major resources (physical, human, information, knowledge, and relational), the LSP's resource bundling practices, and the LSP's long-term financial performances were analyzed (Yew Wong and Karia, 2010). The findings led Yew Wong and Karia (2010) to conclude that resource structuring and bundling are the pathway to competitive advantage. This study highlights the necessity to have a well-structured framework with which to leverage strategic resources as a means to increase organizational performance. The RBV is not one-dimensional; there are other lenses with which researchers look through the RBV.

Knowledge Based View (KBV).

A knowledge-based argument is another permutation of the RBV and a continual theme in the strategic management literature (Barney, 1991; Grant, 1991; Kiessling, et al., 2009). Knowledge that the firm possesses is a source of sustainable competitive advantage, and is regarded as a strategic resource of the firm (McInerney and Koenig, 2011; Hult, et al., 2006). The sustainable competitive advantage realized by an organization depends, in part, upon the efficiency of knowledge integration (Grant, 1996). Knowledge integration, the essence of organizational capability under the KBV, is a function of the level of common knowledge among organizational members, the frequency and variability of the activity, and a structure that economizes on communication (Grant, 1996). Three characteristics of knowledge integration are pertinent to achieving competitive advantage. The efficiency of integration, scope of integration, and flexibility of integration all dictate the ability of knowledge to be a source of competitive advantage (Grant, 1996). Firms can accomplish successful knowledge integration through four mechanisms: transfer, direction, sequencing, and routine (Grant, 1997). Scholars emphasize knowledge transfer as a primary process in which an organization manages knowledge but is insufficient alone (Grant, 1997; Argote, et al., 2000). Direction is needed when specialists issue rules, directives, and operating procedures to non-specialists. Sequencing suggests that individuals coordinate knowledge without direct transfer taking place. At a more complex level, 'organizational routines' are regular patterns of coordinated activity involving multiple individuals (Grant, 1997).

As in the RBV, knowledge alone is not sufficient; the application of knowledge is required for firm performance outcomes (Kiessling, et al., 2009). Kiessling et al. studied 131 firms in Croatia and found that knowledge management positively affects organizational outcomes of firm innovation, product improvement, and employee improvement, supporting the KBV of the firm (Kiessling, et al., 2009).

Competence Based View (CBV).

The CBV, like the KBV, has roots in the RBV, and in some ways extends upon the theory. In their paper, Freiling et al. (2008), criticize the underlying notions of RBV pointing out that the 'house' of resource-based approaches in strategic management theory is neither an homogenous nor a coherent one. Regardless, CBV is founded upon, and has theoretical footings in studying the competitiveness of the firm. The predominant purpose of resource and competence research is to explain firm performance differences by attributing them to the firm's ability to leverage strategic usage of competences and resources (Barney, 1991). CBV's epistemological aim is the explanation of current and future firm competitiveness in markets due to availability of various competences and resources (Freiling, et al., 2008). According to Freiling et al. (2008), competences provide a repeatable, non-random ability to render competitive output based on knowledge, channeled by rules and patterns.

Conversely, Lado and Wilson (1994) took a slightly different approach to CBV. The authors focused on organizational competencies – managerial, input-based, transformational, and output-based. Organizational competencies include a firm's assets, knowledge, skills, and capabilities imbedded in the organization's structure, technology,

processes, and interpersonal relationships. Three assumptions must be met for organizational competencies to yield sustained competitive advantages. These competencies must be heterogeneous, immobile, and have no close substitutes (Lado and Wilson, 1994). Heterogeneous competencies must be valuable and possessed by only a small number of firms. Competencies are immobile to the extent that they are not easily transferrable from one firm to another (Lado and Wilson, 1994; Barney, 1991). The non-substitutable nature of organizational competencies will offer sustained economic benefits to the firm (Lado and Wilson, 1994; Barney, 1991). These assumptions are consistent with the nature of resources under the RBV.

RBV Summary.

While the bulk of empirical research on the RBV of the firm focuses on strategic management implications of theory, the theory has had implications in other fields as well. Among the most important of these is human resource management (Barney and Arikan, 2001). The RBV has helped build a theoretical bridge between the fields of strategy and human resource management (Wright, et al., 2001) and serves as a setting for this research. Under the RBV, superior human capital is predicted to create sustainable competitive advantage (Hatch and Dyer, 2004; Delaney and Huselid, 1996). The concept of competency-based human resource management also has potential to meet many business needs (Dubois, 2010). Although not an exhaustive list, the following advantages are possible through competency-based human resource management: increased productivity, increased financial performance, and enhanced competitive advantage (Dubois, 2010). Not only must the Air Force possess strategic human capital

resources, it must be able to maximize utilization of these resources and their competencies to achieve sustainable competitive advantage through proper force development initiatives.

Human Capital Theory (HCT)

Human Capital Overview.

Theodore W. Schultz (1961) was one of the first to introduce the concept of human capital and what constitutes investment in humans. Economists were among the first academics to discuss the effect of human capital investments, "Economists have long known that people play an important part of the wealth of nations" (Schultz, 1961). The realization that people make large investments in themselves prompted economists to study the effects of such investments as health, education, on-the-job training, study programs, and internal migration to take job opportunities. In his article, Schultz (1961) acknowledged Gary Becker's work on quantifying the return on investments made in training and he reaches a firmer ground on investments made in education. The following excerpt from Schultz's article provides a foundation for the study of human capital:

> Although it is obvious that people acquire useful skills and knowledge, it is not obvious that these skills and knowledge are a form of capital, that this capital is in substantial part a product of deliberate investment, that it has grown in Western societies at a much faster rate than conventional (nonhuman) capital, and that its growth may well be the most distinctive feature of the economic system. (Schultz, 1961)

Literature has defined human capital in several ways, but agreement is made that the aim of human capital is to increase performance, both at the individual and firm level (Ployhart and Moliterno, 2011). Individuals possess a stock of skills, knowledge, and

experiences that can be leveraged for organizational benefit (Ployhart and Moliterno, 2011). Moreover, the ability of human resources to learn is enhanced by their human capital investments in experience and problem solving (Hitt, et al., 2001). Olaniyan and Okemakinde (2008) explain human capital as the investments people make in themselves that enhance their economic productivity, while Ployhart and Moliterno (2011) define human capital as "a unit-level resource that is created from the emergence of individuals' knowledge, skills, abilities, and other characteristics". According to Wright et al. (2001), a basic premise of human capital theory is that firms do not own it; individuals do. While firms may have access to valuable human capital they may not always deploy it to achieve strategic impact (Wright, et al., 2001).

Return on HC Investment.

In his seminal work Becker (1962) specified human capital as either general (off-the-job training) or specific (on-the-job training). General training increases trainee productivity by the same amount as in other firms offering the same training while specific training is provided by firms to equip trainees with knowledge, skills, and abilities that will differentiate trainees from other firms (Becker, 1962). For example, the military offers some forms of training that are useful in the civilian sector while other training, such as training in very specific logistics planning systems, is more specific and not transferrable to non-military organizations. As training builds firm-specific human capital it speeds up the rate at which human resources learn their duties, thereby improving their productivity (Hatch and Dyer, 2004). Naturally, some training will improve productivity and provide superior competitive advantage in a resource-based

context. Training that is valuable, rare, inimitable, and non-substitutable will equip human capital with a higher potential return on investment (Wright, et al., 2001). Training is not the only investment organizations can make to utilize their human resources in such a way that provides them with competitive advantages.

Human capital theory also indicates that formal education is highly instrumental and even necessary to improve the production capacity of the population (Olaniyan and Okemakinde, 2008). Education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability, which is a product of innate abilities and investment in human beings (Olaniyan and Okemakinde, 2008). Higher rates of return on more adequately educated and trained individuals have been empirically demonstrated (Becker, 1962). Studies in the UK and similar developed western economies have estimated a gross rate of return between five and ten percent for each additional year of education (Blundell, et al., 1999). Additionally, employer provided training has been shown to have higher returns than off-the-job training from other sources. Organizations educate and train employees in the hope of gaining a return on the investments in terms of being more productive, more competitive, and consequently a more profitable firm in the future (Blundell, et al., 1999). Managing the selection, development, deployment, education, and training of human capital can significantly improve firm financial and organizational performance (e.g. Hatch and Dyer, 2004; Blundell, et al., 1999; Becker and Gerhart, 1996; Delaney and Huselid, 1996; Hartog, et al., 2012; Hsu, 2008).

Strategic HC Management.

There are many environments for which investment in human capital is a strategy for increased performance and productivity at both the individual and firm level. Snell and Dean (1992) posited that human resource management (HRM) practices constituted investments in human capital. Because human capital becomes economically valuable when manifested in performance (Snell and Dean, 1992) human capital must be strategically managed to achieve higher organizational performance and increased competitive advantage. Huselid et al., (1997) performed a study on 293 U.S. firms from manufacturing, financial, utilities, and service industries and found that strategic HRM effectiveness was significantly associated with firm performance. Other researchers have acknowledged the potential impact of HRM practices on firm performance. Lengnick-Hall et al., (2012) argued that firms with a supply chain orientation would increase organizational performance if they enabled an effective blend of alignment and flexibility among their human resource systems. Griffith (2006) recognized that human resources are one of a firm's most common means to build and maintain dynamic capabilities; he stressed the importance of senior managers' ability to develop personnel through structured programs. Only when the human capital is matched to the right job tasks can a firm realistically expect success in the global marketplace (Griffith, 2006). Barnes and Liao (2012) claimed that supply chain managers must have an awareness of different business functions, and have collaborative and problem solving skills developed through job rotation and training. In the context of supply chain performance the authors argued that training should focus on a deep understanding of the organization's functional areas and becoming a business problem-solver (Barnes and Liao, 2012).

DoD, AF, and LRO Human Capital.

So far the literature in this review has discussed human capital from a civilian, profit maximizing, point of view. A 2001 GAO report stated that strategic human capital management is a pervasive challenge throughout the federal government. "The human capital problems of the Department of Defense and the Department of State can be seen as a broader pattern of human capital weaknesses that have eroded mission capabilities across the federal government" (US Government Accountability Office, 2001). The importance of human capital and its effect on organizational and mission performance cannot be stressed enough. The GAO report further identified key issues within the military to include improving job satisfaction, retention, and commitment to service within the junior officer grades, and retention and professional development of the "best and brightest" within the senior grades. There is an abundance of studies in a civilian context but a paucity of studies that examine the effects of human capital on performance in the Air Force, specifically the effects of LRO human capital. If the Air Force is to keep its valuable stock of human capital and reverse the trends identified by the GAO, the importance and impact of human capital must be studied. The key first step in improving federal agencies' (Air Force) human capital management is to focus on people as a strategic asset (US Government Accountability Office, 2001).

HC Summary.

Investments in human capital can yield substantial benefits to organizations that recognize the power of sound human capital management practices. Education and training represent large investments of resources and are the primary tools in developing

Airmen (Department of the Air Force, 2011). From formal in-residence courses to distance learning computer based training courses, officers continuously receive education and training throughout their careers and are constantly learning. An officer's career provides challenging experiences that are combined with education and training to produce Airmen who possess the tactical expertise, operational competence, and strategic vision to lead and execute the full spectrum of Air Force missions (Department of the Air Force, 2011). The turbulent logistics environment has created a necessity for LROs to improve their knowledge, skills, and abilities through logistics related courses.

Learning Organization

Human resource developers typically promote continuous learning opportunities for individuals for development purposes. However, continuous learning at the individual level is necessary, but not sufficient, to influence perceived changes in knowledge and financial or organizational performance (Marsick and Watkins, 2003). Organizations must also foster continuous learning opportunities and create a climate that encourages knowledge development. Leaders who learn from their experience and influence the learning of others build an organization's climate and culture (Marsick and Watkins, 2003). The view that learning increases competitive advantage has stimulated interest in developing organizations that foster and promote learning (Kontoghiorghes, et al., 2005). The concept of the learning organization, popularized by Senge in 1990, has several definitions in the literature (Kontoghiorghes, et al., 2005). Various definitions stress the different facets of the learning organization, for example:

> [A learning organization] facilitates the learning of all its members and continuously transforms itself (cited in Kontoghiorghes, et al., 2005)

> [A learning organization is] where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together (cited in Kontoghiorghes, et al., 2005)
>
> [A learning organization is] skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights (cited in Kontoghiorghes, et al., 2005)

Effective training and development programs are an integral part of a learning environment that can enhance the federal government's ability to attract and retain employees with the skills and competencies needed to achieve results (US Government Accountability Office, 2012). Learning, and the resultant knowledge, is seen as an outcome of activities performed with the organization's central mission and core competencies in mind (McInerney and Koenig, 2012). Successful organizations, civilian or government, foster a work environment in which people are enabled and motivated to contribute to continuous learning ideologies (US Government Accountability Office, 2012). Rewarding human resources for their learning efforts is good practice and can yield benefits to the organization. Multiple studies have provided evidence to support the claim that learning organizations enhance organizational performance. For example, as cited in Kontoghiorghes, et al. (2005), Ellinger, et al. (2002), and Jashapara (2003) found positive relationships between learning organization characteristics and organizational performance.

Organizational learning should not be confused with the concept of the learning organization. A learning organization may have a culture that supports learning, but it is not equivalent to an organizational learning culture. A single, seven construct, multidimensional instrument has been developed to measure the learning organization,

also known as an organization's learning culture (Marsick and Watkins, 2003; Yang, et al., 2004). Conversely, organizational learning culture has been measured with the use of three constructs: information acquisition, information interpretation, and behavior (Skerlavaj, et al., 2007). Below is a sample of organizational learning definitions found in literature.

> Organizational learning means the process of improving actions through better knowledge and understanding (cited in Garvin, 1993).
>
> Organizational learning is a process of detecting and correcting behavior (cited in Garvin, 1993).
>
> Organizational learning occurs through shared insights, knowledge, and mental models...[and] builds on past knowledge and experience – that is, on memory (cited in Garvin, 1993).

Although the effect of an organizational learning culture has been shown to have positive effects on financial performance (Skerlavaj, et al., 2007) this research will focus on the relationship between the learning organization and organizational performance in the LRO community. Learning organizations are skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights (Garvin, 1993). To what extent LRO organizations exhibit these characteristics has not yet been explored. Furthermore, it is unclear whether or not these characteristics have a perceived effect on LRO organizational performance.

As alluded to already, organizations must convert resources via value creating activities to generate positive organizational outcomes. Learning organizations must also have a process in place to transform learning into a mechanism for increased organizational outcomes. Learning organizations focus on knowledge management to create value for the organization (Aggestam, 2006).

Knowledge Management (KM)

Literature differentiates KM from KBV and thus KM deserves a separate discussion. KM refers to the process in which organizations assess the data and information that exist within them, and is a response to the concern that people must be able to translate their learning into usable knowledge (Aggestam, 2006). A learning organization focuses on the learning process while KM focuses on the result, the output from the learning process. The aim of KM is to create value to the organization and involves activities such as creating, organizing, sharing, and using knowledge (Aggestam, 2006).

In order to manage knowledge, a brief description of what constitutes knowledge is necessary. Knowledge has been described as the whole set of insights, experiences, and procedures which are considered correct and true and which therefore guide the thoughts, behavior, and communication of people (Van der Spek and Spijkervet, 1997). Drawing on the work of Nonaka (1991), there are two kinds of knowledge: explicit knowledge and tacit knowledge. According to Nonaka (1991), explicit knowledge can be expressed in words and numbers and shared in the form of data, manuals, and other tangible methods (Nonaka, 1991). This type of knowledge is formal and systematic and can easily be shared and communicated with others (Nonaka, 1991). Tacit knowledge is highly personal and hard to communicate with others (Nonaka, 1991). This type of knowledge largely depends on the experience and expertise of others (Kulkarni and Freeze, 2011); it is the "know-how" of a master craftsman or military tactician based on years of experience (Nonaka, 1991).

Knowledge is a critical component of military operations and knowledge management is not a new concept to the military as a whole (Maule, 2011). Interesting to note is the difference between what Maule calls Military Knowledge Management and Corporate Knowledge Management (Figure 2). Maule suggests that corporate knowledge management does not have to consider dynamic situational assessments for a real-time attack (Maule, 2011). Military members need knowledge management systems that convey understanding; the military needs a system capable of integrating information and knowledge output with situational data to form an understanding in the mind of the decision maker (Maule, 2011).

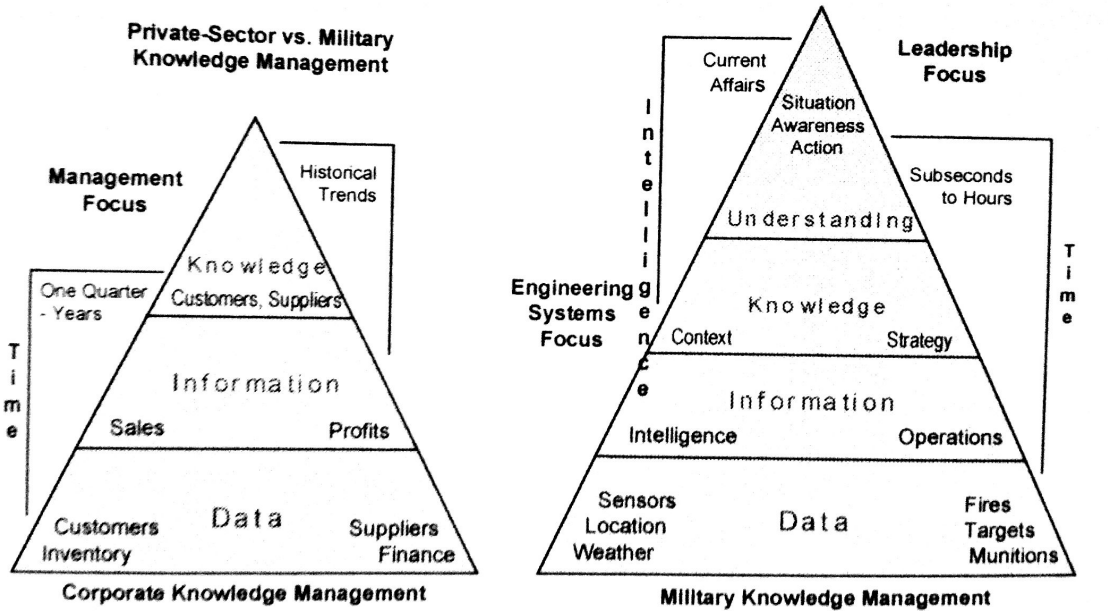

Figure 2: Corporate vs. Military Knowledge Management (Maule, 2011)

LROs require knowledge management practices that aid them in their learning and synthesis of information so they can make sound decisions; they also need an understanding of the ramifications of their decisions as they affect the logistics enterprise. Superior stewardship of LRO's tacit and explicit knowledge may very well be an

untapped source of competitive advantage. Knowledge management may become not only a mission-improving vehicle, but also the very difference between defeat and victory (Ariely, 2011).

Logistics Competencies (or equivalent) - Relevant Guidance

The over proliferation of definitions used in an equivalent manner to *competencies* permits a discussion to delineate the use of these terms in this research. To answer the investigative questions posed in Chapter 1 a review of guidance in the logistics domain is required. The following table summarizes the different verbiage and prescribed competencies (or equivalent) for logistics officers found in the HCS, JP 4-0, AFDD 4-0, and the LRO Career Field Education and Training Plan (CFETP).

Table 1: Prescribed Competencies (or equivalent)

Source	Terminology for *Competencies*	Competency (or equivalent)
DoD Logistics HCS	Workforce Categories	Supply Management Deployment/Distribution/Transportation Maintenance Support Life Cycle Logistics
JP 4-0	Core Capabilities	Supply Maintenance Operations Deployment and Distribution Logistic Services
AFDD 4-0	Functional Communities	Distribution Logistics Planning Maintenance Materiel Management
LRO CFETP	Proficiencies	Acquisition/Life Cycle Logistics Aerial Port Operations Contingency Operations Distribution Management Fuels Management Materiel Management Vehicle Management

For purposes of this research A4LF has provided eight competencies for which LROs require proficiency. The eight competencies are depicted in the table below.

Table 2: A4LF Prescribed LRO Competencies

Source	LRO Competencies
A4LF	Supply Transportation Planning Joint Maintenance Deployment Distribution Life Cycle Logistics

Source: Department of the Air Force (2013)

Logistics Competencies (or equivalent) - Relevant Studies

This section takes a slightly different approach toward clarifying what encompasses the domain of logistics. While guidance provides a foundation for explaining logisticians' knowledge and skill requirements, relevant research is used to illustrate the different approaches that have been taken to shed some light on the matter. First, two sister service studies aimed at highlighting the argument between generalist versus specialist logisticians are reviewed. Next, a review of several Air Force studies highlights the different approaches that have been taken to tackle the issues regarding logisticians' knowledge requirements, education, training, qualifications, breadth and depth, and KSA requirements. Finally, research on non-military logisticians' knowledge and skill requirements is presented.

Sister Services.

The Secretary of the Army created the Logistics (LG) Branch, comprised of Quartermaster, Transportation, and Ordnance Officers, in 2008. The three schools charged with training Army logistics officers were consolidated at Fort Lee, VA in 2011. Similar to what the Logistics HCS calls for, the Army created the Combined Logistics Captains Career Course to introduce captains to logistics functions outside of their basic branch and provide much needed multifunctional skills (Russell, 2012). In Colonel Russell's Army War College Strategy Research Project he points out that "the Army's implementation of the LG branch in 2008 was not an end state, but rather the latest milestone in an ongoing evolutionary process to improve how best to sustain our fighting forces and develop our logistics leaders" (Russell, 2012). An unintended consequence of merging three career fields into one was loss of visibility of which positions required functional logistics skills and expertise (Russell, 2012). The Army struggled to identify the right officer for the right job at the right time. This is not unlike what the Air Force is facing with the LRO career field. The impetus for this research is very much derived from this issue.

In 2010 the Navy released the Supply Corps 2040 Strategic Vision Study. The objective of the study was to "develop a framework that positions the Supply Corps to continue to provide sustained logistics capabilities while remaining relevant and highly valued by our customers – primarily the Navy and joint warfighters – in a resource-constrained environment" (Department of the Navy, 2010). A prevailing theme of the study was the need for future logistics professionals to be able to operate in multiple environments and to have an understanding of logistics from diverse perspectives. The

study acknowledged the need for supply personnel to be enterprise focused and be able to operate in dynamic environments while overcoming certain limitations. Decreasing budgets produced negative effects on end strength requiring logisticians to have a broader focus. A finding in the study was the lack of a comprehensive strategy for developing joint-qualified officers. Although the document updated the Supply Corps mission, vision, and strategy, defined core competencies, and identified new skills that would have to be developed, it did not provide tactical guidance on how to overcome the recognized limitations (Department of the Navy, 2010). Again, the Navy Supply Corps concerns are not unlike what the Air Force currently faces.

Prevailing concerns in achieving a joint-centric logistics workforce are exacerbated by declining budgets and ill-conceived implementation strategies. The uniqueness of each military department's use of logistics human capital and education and training efforts has created an environment of confusion. Numerous studies have been conducted on knowledge and skill requirements for Air Force logisticians.

Air Force.

As discussed, there are many different variations of foundational logistics concepts and prescribed levels of proficiency found in DoD, joint, and Air Force guidance. Attempts have been made to assuage the ambiguity caused by differing sources of guidance for Air Force logisticians. Numerous studies have looked at logistics officer knowledge requirements (Boone, 2001), training (Hall, 2001; Hobbs, 2005; Clark 2005; Larson, 2008), education (Coleman and Stonecipher, 2006; Main, 2008), depth and

breadth (Hall, 2001; Greco III, 2006), qualifications (Steyaert, 2009), and KSA requirements (Thompson, 2013; Roberts, 2013).

Prior to the creation of the LRO career field in 2002 from the merger of Transportation, Supply, and Logistics Plans career fields the topic of logistics officer knowledge requirements was a concern. In 2001 Captain Christopher Boone sought to identify unique supply officer knowledge. Through a sophisticated knowledge audit he identified eleven knowledge categories mandatory for all supply officers (Boone, 2001).

Hall (2001), Hobbs (2005), Clark (2005), and Larson (2008) have looked at the realm of logistics officer training. In 2001, the Air Force Journal of Logistics published an article by Major Reggie Hall investigating the Air Force's need for an integrated school for the Expeditionary Air and Space Force. Major Hall used a cross-sectional survey to answer three questions regarding interdisciplinary logistics training: 1) Do we have an integrated logistics officer training? 2) Do we need it?, and 3) How do we get it? Major Hall found statistically significant correlations that led him to conclude that there was an absence of integrated training, and that there was a need for integrated logistics officer training. Major Hall also solicited recommendations from the survey to answer his third research question. Recommendations included a cross-functional logistics officer training course and a selective expert-level integrated course (Hall, 2001). The following quote summarizes the impetus for his research, "In essence, enhancing logistics officer competency and performance in combat, as well as logistics officer professional development hinges on developing multifunctional officers to fill multidiscipline jobs across the logistics spectrum in all grades" (Hall, 2001). In many ways Major Hall pointed out a prevailing perennial challenge facing all contemporary logisticians.

In 2005, two Air Force officers conducted separate studies in an effort to evaluate LRO training. Major William Clark authored "*Effectiveness of Logistics Readiness Officer Training for Expeditionary & Joint Environments*" as part of his Advanced Logistics Readiness Officers Course (ALROC) graduation requirement. Major Clark's survey results indicated that respondents felt they were being adequately trained in Agile Combat Support doctrine (Combat Support), but they were not confident in joint or sister service doctrine (Clark, 2005). To improve upon this deficiency Major Clark recommended the Air Force develop an intermediate level, in-residence LRO Captain's Course that emphasized joint doctrine and logistics concepts. The second study conducted in 2005 was First Lieutenant Sarah Hobbs' Air Force Institute of Technology (AFIT) thesis titled, "*Assessing Influences on Perceived Training Transfer: An Investigation of Perceptions of Air Force Logistics Readiness Officer Technical School Graduates.*" Lieutenant Hobbs' thesis also relied on survey methodology to investigate influences/attitudes/beliefs of LRO technical school graduates regarding their perceptions about the transfer of training back to the job (Hobbs, 2005). Several theoretical constructs were tested and analyzed via structural equation modeling (SEM). The results showed that influences such as intrinsic incentives, organizational commitment, pre-training motivation, training reputation, subordinate/supervisor support, task constraints, and transfer enhancing activities have a significant relationship with training transfer (Hobbs, 2005). Lieutenant Hobbs' research was unique in that it studied latent variables in an LRO context. Three years later Captain P. Kirk Larson chose to complete his AFIT thesis by performing a Delphi study to determine what training future company grade LROs would require in three expeditionary topics: joint operations, irregular warfare, and

cultural intelligence (Larson, 2008). Captain Larson categorized the responses and garnered insight from subject matter experts as to what facets of expeditionary war fighting LROs found important.

Shifting now to education, in 2006 Majors Todd Coleman and Jerry Stonecipher sought to compare AFIT graduate logistics curriculum to comparable curriculum from choice civilian institutions. The Majors' joint graduate research project motivation spawned from the recognition of the challenges facing logistics leader educators considering the breadth and depth of functions encompassed in the leaders' span of control (Coleman and Stonecipher, 2006). A particularly relevant research question was, "What competencies are required by mid-level logistics leaders" (Coleman and Stonecipher, 2006)? By identifying these competencies and comparing AFIT curriculum to civilian Logistics Management programs the authors could gain insight into the relevance of Air Force logisticians' AFIT education. The chosen definition for competency was, "A cluster of knowledge, skills, and attitudes that can result in leader excellence, regardless of position industry, or geography that can be measured and improved through training development" (Coleman and Stonecipher, 2006). Eight competencies that spanned from strictly logistics centric to business focused were identified through a comprehensive literature review; two competencies were recognized as missing from AFIT graduate curriculum. This deficiency led the Majors to recommend that AFIT maintain the ability to adapt course curriculum to an evolving logistics environment (Coleman and Stonecipher, 2006). In 2008, AFIT graduate student Captain Brian Main looked to determine which analytical skills were useful to LROs in their current positions. Through survey methodology Captain Main gleaned that

Descriptive Statistics, Graphical Statistics, and Forecasting were the most important analytical techniques for LROs (Main, 2008).

An enduring theme in the domain of Air Force logistics officers is whether depth is favored over breadth, or vice versa. In 2001, Major Reggie Hall supported the notion that logisticians need interdisciplinary training (Hall, 2001). Spoken in 1985, the following quote from Lt Gen Leo Marquez summarizes this idea (cited in Hall, 2001),

> Tomorrow's logistician must have a much better, more complete understanding of the entire flow of our logistic process. No longer can we afford to build discrete specialists in maintenance, or munitions, or supply, or transportation.
>
> - Lieutenant General Leo Marquez, Air Force Deputy Chief of Staff for Logistics, 1985

A 2006 Air Command and Staff College (ACSC) study by Major John Greco III posed the question, "Is the Air Force developing enough senior officers with multifunctional logistics experience to successfully transform its logistics processes and contribute significantly to joint operations" (Greco III, 2006)? Through a comprehensive literature review, Major Greco III illustrated the conceptual underpinnings of how the Air Force develops logisticians. Major Greco III posited that LROs should be accessed into one of the three Logistics Readiness Squadron (LRS) functional areas and then branch out after establishing themselves as an expert in that area (Greco III, 2006). These two papers armed future researchers with the impetus to explore whether or not Air Force logisticians are being adequately educated and trained to lead the joint logistics enterprise.

In 2009 Major Trace Steyaert performed a Delphi study to examine whether Air Combat Command (ACC) was developing qualified LROs. The objective of the study was to gather expert opinion on LRO core competency training and qualification from a

panel of experts (Steyaert, 2009). Results from the panel of experts revealed that "a qualified LRO is one who has a competent understanding and knowledge of the three core competencies (materiel management, distribution management, and contingency operations), has completed all required CFETP training tasks and has all Special Experience Identifiers (SEIs)" (Steyaert, 2009). Steyaert found 10 functional skills deemed critical for LROs to become qualified.

Captain Dave Thompson directed his AFIT thesis toward validating logistics officer mission sets and proposing the most useful KSAs for logistics officers. Representative samples of logistics officers were interviewed and participated in focus groups to answer investigative questions. Captain Thompson found six mission sets (Joint Logistics, Life Cycle Logistics, Deployment & Distribution, Supply Management, Repair Network Integration, and Mission Generation) to be the primary mission sets across all logistics officers (21A/M/R) (Thompson, 2013). Opinions of 40 focus groups were used to develop a parent KSA list consisting of 63 KSAs (Thompson, 2013). These parent KSAs were the most frequently cited by the focus groups. Captain Matt Roberts' AFIT thesis complemented Captain Thompson's thesis with the same goal in mind. Captain Roberts used the same methodology to answer his investigative questions, but he focused solely on LROs. LRO mission sets were considered to be Deployment & Distribution, Materiel Management, Life Cycle Logistics, and Joint Logistics (Roberts, 2013). Focus groups agreed that LROs were responsible for being knowledgeable in 60 parent KSAs (Roberts, 2013). These two studies were also sponsored by A4L and were used to help develop the DCoL framework. A summary of the Air Force studies is presented in Table 3.

Table 3: Summary of Air Force Studies

Author(s)	Finding
Boone (2001)	Eleven knowledge categories mandatory for all supply officers
Hall (2001)	Absence of integrated training and a need for integrated logistics officer training
Hobbs (2005)	Intrinsic incentives, organizational commitment, pre-training motivation, training reputation, subordinate/supervisor support, task constraints, and transfer enhancing activities have a significant relationship with training transfer
Clark (2005)	LROs are adequately trained in Agile Combat Support but not confident in Joint or sister service doctrine
Coleman and Stonecipher (2006)	Two of eight identified competencies missing from AFIT graduate curriculum
Greco III (2006)	LROs should be accessed into one of three functional areas and then branch out after becoming functional experts
Main (2008)	Descriptive statistics, graphical statistics, and forecasting are the most important analytical techniques for LROs
Larson (2008)	Determined training requirements for company grade LROs in the areas of joint operations, irregular warfare, and cultural intelligence
Steyaert (2009)	Ten functional skills deemed critical for LROs to become qualified within Air Combat Command
Thompson (2013)	Sixty-three parent KSAs for Aircraft Maintenance Officers (21A). Outlined benefits and opportunites of consolidating training and education between LROs and 21As
Roberts (2013)	Five mission sets and 60 parent KSAs for LROs

Several research efforts, spanning more than a decade, have attempted to clear up the confusion manifested in disjointed logistics guidance and a changing logistics environment. Civilian logisticians face the same problems as Air Force logisticians.

Industry.

The ebb and flow of the logistics industry does not solely affect the military, civilian logisticians are susceptible to evolving requirements as well. Researchers have

attempted to shed some light on skill requirements for logisticians; two are discussed (Gammelgaard and Larson, 2001; Murphy and Poist, 2007).

In 2001, Gammelgaard and Larson used survey methodology to determine which skills and competencies supply chain management (SCM) practitioners need. Skills were defined as general context-independent knowledge or general tools and rules taught in most logistics courses. The authors stated, "Competencies refer to experience-based and context-dependent knowledge" (Gammelgaard and Larson, 2001). Survey respondents were asked to rate the importance of 45 skills for SCM, in which 17 highly important skill areas surfaced.

Murphy and Poist (2007) conducted a longitudinal assessment of senior-level logistics executive skill requirements from 1991 to 2007. The authors noted that similar previously accomplished studies used a limited amount of managerial skills and knowledge areas. In contrast, Murphy and Poist used an 80-item business, logistics, and management (BLM) framework to investigate skill requirements of senior-level logistics managers (Murphy and Poist, 2007). An important finding from Murphy and Poist's research is that they conclude a logistician should be a manager first and a logistician second. Today's senior-level logistician has more of a supply chain orientation as determined by the difference from the 1991 study and the 2007 study (Murphy and Poist, 2007). The results of this study could prove useful for identifying the educational preparation that might be required when hiring logistics managers (Murphy and Poist, 2007).

This review of applicable logistics guidance and prior research leads into a discussion of what courses are available to Air Force logistics officers to receive education and training.

Air Force Logistics Education and Training Courses

The logistics courses available to LROs are abundant. A simple keyword search on Randolph.mil reveals 41 courses under *logistics*. These courses are administered by AFIT's School of Systems and Logistics, and range from one hour in length to tens of hours in length.

Education and training have several definitions. According to AFDD 1-1 education provides critical thinking skills, encouraging exploration into unknown areas and creative problem solving (Department of the Air Force, 2011). Conversely, training is focused on a structured skill set, and the results of training performance should be consistent (Department of the Air Force, 2011). The delineation between education and training is not always clear, however. For example, AFDD 1-1 uses both words in sentences such as, "Education and training facilitate the transition from one level of experience to the next and are critical to creating productive experiences in an Airman's development." (Department of the Air Force, 2011)

The courses that LROs attend to enhance their logistics knowledge and skill sets are designed to both educate and train. For example, the Contingency Wartime Planners Course is filled with classroom instruction and hands-on skill development. For purposes of this research, the questions that are geared toward finding out which courses LROs

have attended, or would have liked to attend, do not distinguish between whether these courses solely educate, or exclusively train.

For purposes of this research a list of key logistics courses was furnished by A4LF. The list of courses was used as a foundation for two survey questions.

Deliberate Continuum of Learning (DCoL)

According to the LRO CFETP a DCoL is a purposeful education and focused training roadmap that supports career path progression across key logistics mission sets to include deployment & distribution, supply chain, repair network integration, life cycle logistics, and joint logistics (Department of the Air Force, 2013). Senior leaders must do their part to plan, develop, manage, conduct, and evaluate effective and efficient education and training programs (Department of the Air Force, 2013).

The DCoL is an evolving concept and the results of this research will be used to assist its development. The previously reviewed literature on military logistics guidance and research on knowledge and skills requirements for logisticians highlight the need for a core set of terms with which to build from. A4LF has furnished a list of competencies that were used in the methodology of this study. The eight competencies specific to Air Force logisticians is depicted in Table 4 below. These competencies were derived from JP 4-0 and represent a core set of activities that best describe knowledge and skill requirements for Air Force logistics officers. The competencies can be categorized into three functions: Supply, Deployment and Distribution, and Maintenance (Department of the Air Force, 2013). This research will attempt to answer how well these competencies

correspond to the actual duties being performed by LROs by determining proficiency requirements for each competency.

Table 4: A4LF Prescribed LRO Competencies

Source	LRO Competencies
A4LF	Supply Transportation Planning Joint Maintenance Deployment Distribution Life Cycle Logistics

Source: Department of the Air Force (2013)

LRO Billets

LROs have a wide variety of different jobs they can hold as they progress from entry level to senior leader. The Air Force Career Path Tool (CPT) suggests a pyramid structure that helps deliberately vector officers as they move between jobs. The range of duty titles LROs have is quite extensive but the CPT provides a basis for categorizing traditional duty titles, e.g. Officer in Charge (OIC), Flight Commander, Operations Officer, and Squadron Commander. Certain jobs inherently have more of a tactical focus while others are more operationally or strategically oriented. This research will attempt to answer how LROs categorize their duties, e.g. tactical, operational, or strategic.

Summary

The RBV offers a motivation to study HC, learning culture, and KM as they relate to organizational performance. By maximizing investment in HC, a culture that fosters learning, and solid KM practices, an organization can yield substantial competitive advantage and increased organizational performance.

Much time was spent attempting to clarify what logisticians need to know to aid in the development of a survey aimed at answering the research questions posed at the beginning of this thesis. None of the previous research efforts highlighted in this literature review attempted to discern which logistics courses that are available to LROs are valuable in helping LROs perform their jobs better.

III. Methodology

Overview

This chapter presents the rationale for empirical question development as well as the hypotheses formulated based on theoretical justification found in literature. The research methodology used to answer the investigative questions and test the hypotheses is also discussed, to include design, population, sampling, data collection, data preparation, data analysis, and method of administration.

Hypothesis Development

This section presents the rationale for how the hypotheses tested in this study were developed as well as a visual representation of the theoretical model. The actual scales used to measure each of the constructs are presented later in this chapter.

Human Capital and Organizational Performance.

A number of studies have acknowledged the relationship between human capital and innovative performance, and organizational performance (Hitt, et al., 2001; Hatch and Dyer, 2004; Hsu, 2008; Alpkan, et al., 2010). This thesis tested the following hypothesis:

Hypothesis 1: LRO human capital has a positive impact on organizational performance

The Learning Organization and Organizational Performance.

According to Marsick and Watkins (2003) there is a correlation between the learning organization and financial and organizational performance. The Dimensions of

the Learning Organization Questionnaire (DLOQ) has been used to measure an organization's learning culture for several years (Marsick and Watkins, 2003; Yang, 2003). Tseng (2010) demonstrated a positive relationship between learning organization practices and organizational effectiveness. In 2005, Kontoghiorghes et al. demonstrated the predictive capability of certain learning organization characteristics on organizational performance. Other studies have also demonstrated a relationship between learning culture and organizational performance (e.g. Yang, 2003); therefore, this thesis tested the following hypothesis:

Hypothesis 2: LRO learning culture has a positive impact on organizational performance

Knowledge Management and Organizational Performance.

Knowledge management has long been an area of study. Kiessling et al. (2010) found a positive relationship between firm knowledge management and certain organizational outcomes and Zack et al. (2009) found a positive relationship between knowledge management and organizational performance. An objective of this thesis was to examine the relationship between LRO knowledge management practices and organizational performance. Accordingly, the following hypothesis was tested:

Hypothesis 3: LRO KM has a positive impact on organizational performance

Proposed Theoretical Model with Hypotheses.

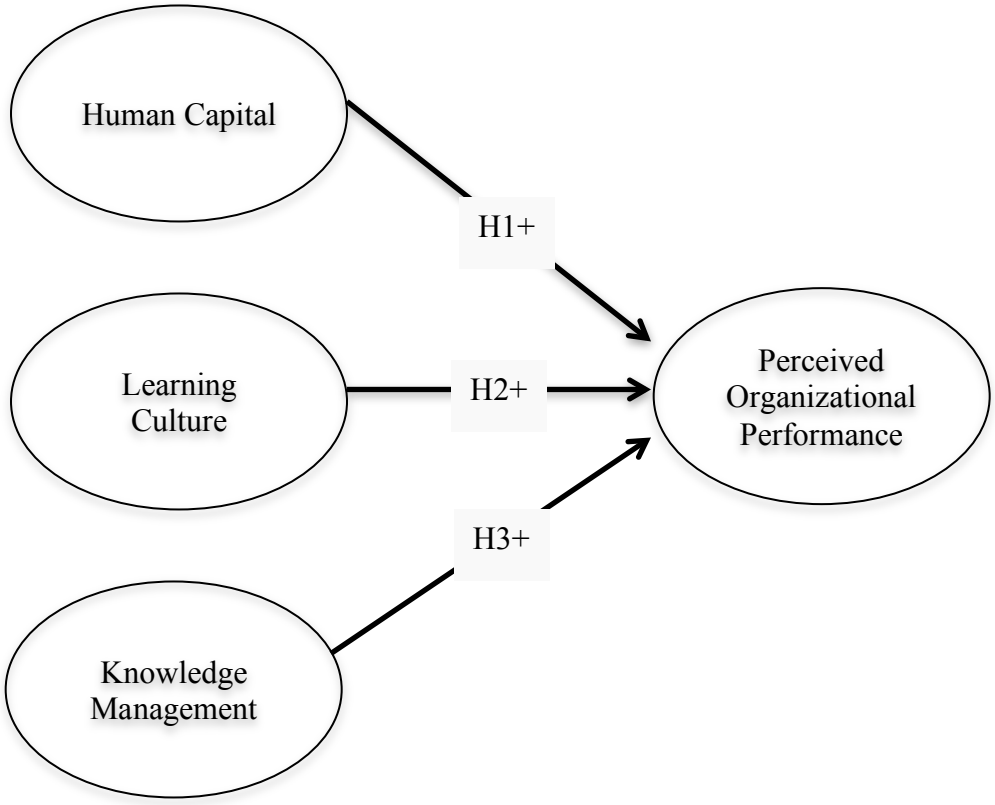

Figure 3: Theoretical Model

Research Design

This empirical study used a cross-sectional web-based self-administered survey to develop an understanding of LROs perceptions of their logistics competency proficiency levels and the usefulness of logistics education and training courses. The survey was also used to test the relationship between human capital, learning culture, and knowledge management, and organizational performance in an LRO context. Survey methodology was utilized due to its ability to capture unobservable information from geographically separated respondents in a swift and cost effective manner (Leedy and Ormrod, 2010).

The survey was administered in December 2013 and January 2014 and sent to the population of LROs based on a listing from the Air Force Personnel Center (AFPC) that was retrieved on 15 July 2013.

Institutional and Air Force Approval

The Institutional Review Board at AFIT granted approval for this study on 25 September 2013 (Appendix A). An Air Force survey control number was applied for and received on 7 November 2013. The survey control number for the survey used in this study is AF13-209AFIT. A copy of the approval letter granting the survey control number can be found in Appendix B.

Population and Sample

The population of interest was active duty LROs between the ranks of second lieutenant and colonel. In order to have the best chance of being able to make generalizable statements, the entire population of second lieutenant through colonel active duty LROs was chosen as potential survey respondents. A web-based survey allowed for convenient targeting of an entirely geographically diverse population while not expending a great amount of resources.

The list furnished by AFPC contained 1,518 names of LROs as a potential sample. The number of potential respondents was further reduced to 1,411 LROs due to the inability to locate valid email addresses for all 1,518 names.

Instrument Development

This section will detail how the instrument used in this study was designed and how the questions were crafted starting with specific questions constructed to answer the investigative questions, followed by demographic questions. The complete instrument for this study can be found in Appendix C.

Survey Design.

The survey used to gather data for this study was a cross-sectional self-administered web-based survey consisting of six separate pages. As soon as the respondents clicked on the link to open up the survey they were greeted with an information page explaining the purpose of the survey, a confidentiality statement, a participation statement informing the respondents that their participation was strictly voluntary, simple instructions, and contact information for the researcher. The second page of the survey consisted of Likert scale questions designed to measure the constructs in the theoretical model. These questions were intentionally placed at the beginning of the survey due to their importance and ability to capture the respondent's interest (Babbie, 1990). The questions designed to measure the constructs were all fashioned with a seven-point Likert scale to maintain consistency for the respondent so they were not required to re-frame any of their answers on a different scale. Page three included questions concerning logistics competencies and pages four and five asked the respondent questions about logistics education and training courses. A series of demographic questions were asked on the final page. The demographic questions were

intentionally placed at the end of the survey to help reduce respondent fatigue as they progressed through the early stages of the survey.

Participants of this study were kept completely anonymous and were allowed to stop the survey and resume at a later time without having to start over. While this was convenient for the respondents, it did allow them to stop the survey and never come back, resulting in abandonment.

Theoretical Model Construct Scales.

Existing measures for the theoretical model were adapted and incorporated into a single survey to capture participant perceptions about human capital, learning culture, knowledge management, and perceived organizational performance. The survey was administered using a commercial survey tool. Three constructs were used as independent variables and one for the dependent variable. The studies reviewed to obtain measurement scales and the questions therein follow.

The fist construct was Human Capital. In order to measure this construct, this study used a five-item scale developed by Subramaniam and Youndt (2005). The five items used in the aforementioned study were based on the works of Schultz (1961) and Snell and Dean (1992). The scale reflects the overall skill, expertise, and knowledge levels of an organization's employees (Subramaniam and Youndt, 2005). A seven-point Likert format was used for the scale ranging from strongly disagree to strongly agree and had a Cronbach's alpha measure greater than .70. For this study, question one item from the HC scale was determined to be double-barreled and was consequently split into two questions. The questions were also adapted to be consistent with Air Force terminology.

The adapted questions used in this study to make up the HC construct are found in Table 5 below.

Table 5: Human Capital Scale

On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) LROs. *Human Capital is defined as the knowledge, skills, attitudes, and abilities possessed by individuals.
HC1: Our LROs are very intelligent.
HC2: Our LROs are very creative.
HC3: Our LROs are very talented.
HC4: Our LROs are specialized in their jobs.
HC5: Our LROs are producing new ideas and knowledge.
HC6: Our LROs are best performers.
Notes: Adapted from Subramaniam and Youndt (2005). Original Cronbach's alpha was >.70.

The next construct is the Learning Organization. The scale used for this study was based on research conducted by Marsick and Watkins (2003), in which they included a DLOQ Self-Scoring questionnaire developed in 1997. The authors developed a 43-item, seven-construct instrument to measure the learning culture of an organization (Marsick and Watkins, 2003; Yang, 2003). The definition of the seven constructs can be found in Appendix D. A six-point Likert format was used for the DLOQ, ranging from almost never to almost always. Yang (2003) describes how the 43-item instrument was tested with exploratory samples and paired down to 21 items with adequate reliability. It is recommended that the 21-item scale be used for researchers wishing to determine the relationship between the learning culture and organizational performance (Yang, 2003). For this study, a seven-item, single construct was used to measure learning culture as a means to keep the number of survey items to an acceptable number. The seven-item

scale has been shown to form a concise version of the DLOQ with an acceptable reliability estimate (Cronbach's alpha = .84) (Yang, 2003). This study adapted the original questions to be consistent with AF terminology. The adapted seven-item DLOQ used in this study is presented below in Table 6.

Table 6: Learning Organization (Culture) Scale

On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) learning culture. *Learning Culture is defined as the value the organization places on learning.
LO1: In my organization, people are rewarded for learning.
LO2: In my organization, people spend time building trust with each other.
LO3: In my organization, teams/groups revise their thinking as a result of group discussions or information collected.
LO4: My organization makes its lessons learned available to all employees.
LO5: My organization recognizes people for taking initiative.
LO6: My organization works together with the outside community (other organizations/squadrons/or equivalent) to meet mutual needs.
LO7: In my organization, leaders ensure that the organization's actions are consistent with its values.

Notes: Adapted from Yang (2003). Original Cronbach's alpha was .84.

The Knowledge Management (KM) construct measures an organization's KM processes (Kiessling, et al., 2009). The scale used in this study was adapted from Kiessling et al. (2009), and contains five items with an original Cronbach's alpha of .92. Kiessling et al. (2009) adapted the KM scale from Gold et al. (2001) to measure firm KM competency with a seven-point Likert format, ranging from strongly disagree to strongly agree. Results from Kiessling et al. (2009) indicate that firm knowledge management has positive influences on organization outcomes. Gold et al. (2001) found similar results with a positive relationship between knowledge infrastructure capability and knowledge

process capability, and organizational effectiveness. The KM construct questions were adapted to ensure consistency with AF terminology. The five questions adapted from Kiessling et al. (2009) to measure KM are presented below in Table 7.

Table 7: Knowledge Management Scale

On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) knowledge management practices. *Knowledge is defined as the awareness or familiarity gained by a fact or situation.
KM1: Our organization has processes for integrating different sources and types of knowledge.
KM2: Our organization has processes for converting competitive intelligence into plans of action.
KM3: Our organization has processes for taking advantage of new knowledge.
KM4: Our organization has processes for acquiring knowledge about business partners.
KM5: Our organization has processes for exchanging knowledge with our business partners.

Notes: Adapted from Kiessling et al. (2009). Original Cronbach's alpha was .92.

The dependent variable was Perceived Organizational Performance. In order to measure this construct a seven-item scale was adapted from the work of Delaney and Huselid (1996). The authors point out that the use of perceptual measures permits an analysis of profit-making and nonprofit organizations, such as the military (Delaney and Huselid, 1996). The original scale had a Cronbach's alpha of .85 and was measured using a Likert format from one to four (1 = worse, 4 = much better). Questions to measure perceived organization performance in this study can be found below in Table 8.

Table 8: Organizational Performance Scale

On a scale from 1 (Much Worse) to 7 (Much Better) how would you compare your organization's (squadron or equivalent) performance over the past 3 years to that of other organizations that do the same kind of work? What about in relation to...
OP1: Quality of products, services, or programs?
OP2: Development of new products, services or programs?
OP3: Ability to attract essential employees?
OP4: Ability to retain essential employees?
OP5: Satisfaction of customers or clients?
OP6: Relations between management (leadership) and other employees?
OP7: Relations among employees in general?

Notes: Adapted from Delaney and Huselid (1996). Original Cronbach's alpha was .85.

Non-Theoretical Model Questions.

Questions designed to answer investigative questions two through seven were constructed with information about competencies and education and training courses provided by the research sponsor. Specific lists of competencies and courses were used to satisfy the research objectives of this study. A series of demographic questions were designed to gather information that could be used to assess trends in the data based on various respondent traits. In addition to the demographic questions, other questions used to answer the investigative questions posed in Chapter 1 can be found in the complete survey instrument located in Appendix C.

Survey Biases

The method of survey administration for this research has several advantages but is also not without potential threats to the validity of the results. Specific validity threats to this study include non-response bias, common method bias, and coverage error.

Non-response bias occurs when respondents do not answer every question in a survey or when individuals identified in a sample do not provide any data at all (Fowler, Jr., 2009). Theoretically, the constructs examined do not depend on one's inclination to complete a survey; therefore non-response bias was not predicted to be an issue. Results of non-response bias assessment for this study are illustrated in Chapter 4.

Common method biases can arise from having a common rater, common measurement context, a common item context, or from the characteristics of the items themselves (Podsakoff, et al., 2003). Method biases can be prevalent in behavioral research where the data for both the dependent and independent variable are obtained from the same person in the same measurement context using the same item context and similar item characteristics (Podsakoff, et al., 2003). Common method bias assessment for this study is presented in Chapter 4.

Coverage error can be can be problematic in survey research and "results from every unit in the survey population not having a known chance of being included in the sample" (Dillman, 2007). In order to reduce coverage error in this study all members of the population were contacted (Dillman, 2007), with certain limitations due to the inability to find an accurate e-mail address for some potential respondents. Additionally, coverage error was minimized with the method of survey administration. Because every potential respondent contacted had access to e-mail, a web-based survey helped reduce coverage error (Groves et al., 2004). The percentage of those unable to be contacted was 7%.

Pre-Test, Pilot Test, Data Collection, and Data Preparation

This section describes how the survey was honed through a pre-test and a pilot test, as well as how the data for this study was collected and prepared for analysis.

Pre-Test.

A pre-test was conducted to ensure item specificity, readability, representativeness and face validity. Six individuals were selected to complete the survey and provide feedback about any procedural or production problems (Dillman, 2007). The six potential respondents included one doctoral student and five graduate students, all in the logistics and supply chain management discipline. Additionally, two out of the six were LROs. Out of the six that were asked to take the survey, five responded for a response rate of 83%. The survey was edited for better clarity and grammatical fidelity based on the feedback provided by those who completed the pre-test. As only minor changes were suggested, only one round of pre-testing was conducted.

Pilot Test.

A pilot test was conducted with a total of 35 potential respondents. Out of the 35 asked to take the survey 31 responded, for a response rate of 89%. Due to the small sample size of the pilot test an exploratory factor analysis was not conducted. Hair et al. (2006) suggest that the sample size should be at least 50 with a minimum of five observations per variable. All pilot test responses were complete and accurate and therefore added to the data gathered from live survey implementation.

Data Collection.

A-priori power analysis indicated that a minimum of 76 participants were required to obtain a power of .80 for investigating the proposed theoretical model at the .05 level of significance, assuming a conservative model R^2 estimate of .15 (Soper, 2014). Hair et al. (2006) point out that maintaining a power of .80 in multivariate regression requires a minimum sample size of 50 and preferably 100 for most research situations. To achieve at least 76 responses, data was collected using a web-based questionnaire developed with the commercial software provided by SurveyMonkey.com®. All responses were password protected within the software system with access provided only to the primary researcher. Data collection commenced on 12 December 2013 and continued through 8 January 2014. E-mail messages were sent directly to the population of LROs in the rank of second lieutenant through colonel for which valid e-mail addresses were obtained. Reminder e-mails were sent on 19 December 2013 in an attempt to increase the response rate. Each name on the list of LROs was searched for on the Air Force's global e-mail address list for contact information. If the name on the list could not be identified as the correct person they were not included as a potential respondent. A total of 107 LROs did not receive an email due to ambiguity and uncertainty when matching names to correct e-mails. A total of 1,411 LROs were sent participation request emails for this study. A copy of the email sent to the LRO population can be found in Appendix E. The response rate for this study was 43.7%.

Data Preparation.

Prior to data analysis standard data cleansing procedures were performed. With respect to the construct responses, satisficing was an issue of concern. Satisficing is a decision-making strategy in which the easiest adequate solution is chosen (Daniel, 2012). Respondents who satisfice rather than optimize their responses may be prone to choosing the same response for every question on a Likert scale, opting for extremeness by choosing the end points (Groves, et al., 2004), choosing ascending or descending successive responses, or some other noticeable pattern that indicates the respondent did not optimally answer the questions. Risk factors for satisficing include time pressure, motivation, anonymity, cognitive skills, task difficulty, and survey length (Daniel, 2012). The construct questions were intentionally placed at the beginning of the survey to mitigate some of these potential risk factors. Nevertheless, there were some responses that did stand out as lacking fidelity. Of the 617 usable responses, in which there were no missing data and every construct question was answered, 75 were flagged for noticeable patterns. After careful examination 75 responses were removed from final analysis due to satisficing.

This study used an ordinal seven-point Likert scale for each of the Likert type questions. At the construct level each of the questions in a particular scale were added together and divided by the number of questions to find the mean value of the construct (Boone Jr. and Boone, 2012). This ensured the construct was continuous and could be analyzed using parametric statistics (Norman, 2010).

Only complete survey responses were used to answer the investigative questions not dealing with the theoretical model. Of the 617 respondents that attempted the survey,

510 completed the entire survey. Thus, the abandonment rate for the survey was 17.34%. Complete surveys were used to ensure each survey could be segmented or analyzed by various demographic characteristics.

Data Analysis

This study utilized various statistical tools for data analysis. Exploratory factor analysis (EFA) was used to determine the number and nature of common factors needed to account for the pattern of correlations among the variables in this study (Fabrigar, 1999). The main goal of EFA was to determine if the scales used in the survey were representative of the latent constructs they were designed to measure in the context of the data gathered in this study. Four existing scales were used in this research to test the theoretical model presented earlier. As such, there are compelling theoretical and empirical rationales for the relationships depicted in the theoretical model (Fabrigar, 1999). EFA was used to explore the theoretical model's latent factors and their interrelationships in an attempt to recover the separate constructs depicted in the theoretical model (Matsunaga, 2010). The statistics software used for EFA was JMP 10.0 and SPSS 18.0.

Multivariate regression was used to examine the relationship between the three independent variables and the dependent variable depicted in the theoretical model (Hair, et al., 2006). Both JMP 10.0 and SPSS 18.0 were use to assess the assumptions of regression. After the tests for regression assumptions the data was analyzed with the JMP 10.0 software. More discussion regarding the assumption checks is presented in Chapter 4. Using regression, the independent variables human capital, learning culture,

and knowledge management were analyzed to determine which, if any, were statistically related to organizational performance. These findings are presented in Chapter 4.

Descriptive and summary statistics were used to evaluate and analyze the non-latent variable survey questions essential to answering investigative questions two through seven posed in this research. Presentation of the findings can be found in Chapter 4.

Summary

Chapter 3 presented the development of the hypotheses, population, sampling frame, development of the survey instrument, and data collection, preparation and analysis techniques. Chapter 4 will present the descriptive statistics of the data, discuss how it was analyzed, and the provide answers to the investigative questions posed in Chapter 1.

IV. Results and Analysis

Overview

This study surveyed active duty LROs in the ranks of second lieutenant through colonel to answer seven investigative questions aimed at providing a meaningful solution to the problem statement posed in Chapter 1. This chapter begins with a discussion of the demographics of the study participants and is followed by sequential analyses and results for each of the individual investigative questions.

Participant Demographics

Following a description of the demographics of this study's participants the analysis and results of each investigative question is presented. Table 9 below includes information about the survey participants including rank, average time in service, average time in job, and the percentage of survey respondents who were prior enlisted.

Table 9: Demographic Information

Rank	**Count (%)**
2d Lt	30 (5.9%)
1st Lt	68 (13.3%)
Capt	156 (30.6%)
Maj	110 (21.6%)
Lt Col	111 (21.8%)
Col	35 (6.9%)
Time In Service	**Average**
Years	9.78
Months	4.54
Time in Job	**Average**
Years	0.73
Months	4.46
Prior Enlisted	**Count (%)**
Yes	166 (32.5%)
No	344 (67.5%)

Notes: n = 510 for completed surveys

As depicted in the table above, the majority, or 30.6% of the 510 respondents that completed the entire survey were Captains. Interestingly, partitioning the responses by Company Grade Officers (CGO) and Field Grade Officers (FGO) reveals that the two groups were almost equal in their response rates with CGOs accounting for 49.8% and FGOs accounting for 50.2%. The average time in service for the respondents was approximately 10 years and the average time in job was approximately one year. Almost a third of the respondents indicated they had time as an enlisted member, but they were not asked to distinguish between enlisted time and time as an officer. Respondents were also asked information about their current job, including their duty title and level of primary duties. This information is below in Table 10.

Additionally, respondents were requested to indicate their area of responsibility and assigned Major Command (MAJCOM). Table 11 presents the counts for how the respondents categorized their area of responsibility and MAJCOM.

A wide variety of responses were provided for all four questions concerning participants' jobs. Educational background information was also sought from the respondents. Specifically, the respondents were asked to indicate their highest level of education and the emphasis of their undergraduate, graduate, and postgraduate work. Table 11 indicates that a majority of the participants possess graduate degrees. The respondents indicated a diverse array of degree emphasis for both Bachelor's and Master's degrees.

Table 10: Demographic Information

Duty Title	Count	Level of Primary Duties	Count
Deputy Group Commander	9	Element	19
Duty Officer	12	Flight	98
Director	18	Squadron	141
Executive Officer	30	Group	35
Flight CC	97	Wing	31
Group Commander	9	MAJCOM	48
IDO	18	NAF	15
Instructor	11	Air Staff	25
Officer in Charge	33	Joint Staff	43
Operations Officer	46	Other	55
Program Manager	13	Branch	4
Section Chief	26	Center	1
Squadron Commander	56	COCOM/MAJCOM	8
Student	19	Detachment	2
Other	113	Division	2
Air Attache	2	FOU/Agency	11
Chief/Director	33	Joint	7
Career Broadener	4	NATO	2
Commander	6	OSD	2
Deputy	22	Other (no common theme)	12
Executive Officer	2	Student	4
FAM	2		
Joint Staff	4		
Manager	4		
Other (no common theme)	10		
Planner	6		
Staff/Action Officer	18		

Notes: n = 510 for responses leading up to "Other"; responses under "Other" sum to the "Other" count

Table 11: Demographic Information

Area of Responsibility	Count	MAJCOM	Count
Aerial Port	48	ACC	63
Cargo Movement	8	AETC	53
Contingency Operations	45	AFMC	52
Distribution	23	AFSC	3
Logistics Plans	40	AMC	112
Materiel Management	69	AFSOC	13
Transportation	17	AFGSC	11
Vehicle Management	14	PACAF	41
Vehicle Operations	4	USAFE	35
Other	242	CENTCOM	16
All Logistics Functions	87	DLA	9
Acquisition Logistics	11	HAF	25
Deployed	12	DRU	8
Depot	5	FOA	4
Distribution Operations	10	Other	65
Education/Training	16	AFCENT	4
Executive Officer	8	AFDW	2
Foreign Military Sales	4	AFRICOM	3
Fuels	7	AFSC	5
Inspector General	4	Agency	2
Joint	7	EUCOM	5
Non-LRO	4	JOINT	11
Other (no common theme)	14	NATO	3
Planning	16	OSD	1
Policy	3	Other (no common theme)	17
Programming/Budgeting	3	PACOM	3
QA/Compliance	4	TRANSCOM	7
Recruiting	2	USSOCOM	2
SPO	2		
Staff	12		
Supply Chain	11		

Notes: n = 510 for responses leading up to "Other"; responses under "Other" sum to the "Other" count

Table 12: Demographic Information

Highest Level of Education Completed		Count (%)	
Bachelor's Degree		137 (26.9%)	
Master's Degree		364 (71.4%)	
PhD		9 (1.8%)	
Bachelor's Degree	**Count**	**Master's Degree**	**Count**
Business Related	144	Logistics or SCM Related	128
Science Related	139	Business Related	163
Other	227	Science Related	31
Aviation/Aerospace	4	N/A	36
Communication	7	Other	152
Crim Justice/Legal	20	Aerospace/Aeronautics	8
Education	13	Criminal Justice/Legal	7
Engineering	8	Developmental Education Degree	3
English	6	Education	8
Foreign Language	8	History	7
Health	5	Human Relations/Resources	10
History	48	International Relations	30
Humanities	6	Leadership/Mil Science/National Security	22
International Studies	14	Logistics/SCM	2
Liberal Arts	17	Management/Public Admin/Business	24
Other (no common theme)	22	Other (no common theme)	25
Political Science	33	Political Science	6
Sociology/Social Science	16		

Notes: n = 510; PhD responses included Management, Operations Management, 20th Century US Business History, and Curriculum & Instruction; responses leading up to "Other" sum to 510, responses under "Other" sum to the "Other" count

Investigative Question 1

Investigative Question 1 was postulated to examine the relationship between the learning organization (culture), human capital, and knowledge management of LROs and organizational performance. What follows is the analysis and results of Investigative Question 1.

Descriptive Statistics.

Item Level Statistics.

Table 13 contains item level details including the mean and standard deviation across all 542 respondents. There were no missing values for any item.

Table 13: Item Details

Item	Statement	Mean	Standard Deviation
HC1	Our LROs are very intelligent.	5.83	0.99
HC2	Our LROs are very creative.	5.81	1.01
HC3	Our LROs are very talented.	5.86	0.98
HC5	Our LROs are producing new ideas and knowledge.	4.98	1.36
HC6	Our LROs are best performers	5.45	1.19
LO1	In my organization, people are rewarded for learning.	5.31	1.31
LO2	In my organization, people spend time building trust with each other.	5.25	1.33
LO3	In my organization, teams/groups revise their thinking as a result of group discussions or information collected.	5.32	1.31
LO4	My organization makes its lessons learned available to all employees.	4.93	1.53
LO5	My organization recognizes people for taking initiative.	5.50	1.27
LO6	My organization works together with the outside community (other organizations/squadrons/or equivalent) to meet mutual needs.	5.66	1.32
LO7	In my organization, leaders ensure that the organization's actions are consistent with its values.	5.73	1.23
KM1	Our organization has processes for integrating different sources and types of knowledge.	4.94	1.35
KM2	Our organization has processes for converting competitive intelligence into plans of action.	4.68	1.43
KM3	Our organization has processes for taking advantage of new knowledge.	4.80	1.42
KM4	Our organization has processes for acquiring knowledge about business partners.	4.43	1.53
KM5	Our organization has processes for exchanging knowledge with our business partners.	4.51	1.55
OP1	Quality of products, services, or programs?	5.14	1.26
OP2	Development of new products, services, or programs?	4.73	1.37
OP3	Ability to attract essential employees?	4.21	1.37
OP4	Ability to retain essential employees?	4.15	1.45
OP5	Satisfaction of customers or clients?	5.01	1.29
OP7	Relations among employees in general?	4.97	1.35

n = 542

Construct Level Statistics.

Descriptive information for each construct can be found below in Table 14. The mean, standard deviation, and Cronbach's alpha are presented. All four constructs had reliability measures greater than .70, indicating adequate reliability (Hair, et al, 2006).

Table 14: Construct Descriptives

Construct	Number of Items	Cronbach's alpha	Mean	Standard Deviation
Human Capital	5	0.87	5.59	0.90
Learning Organization (Culture)	7	0.87	5.39	1.00
Knowledge Management	5	0.91	4.68	1.26
Organizational Performance	6	0.88	4.70	1.07

n = 542

Exploratory Factor Analysis.

An exploratory factor analysis (EFA) was conducted using Principal Components Analysis as the extraction method and Promax as the rotation method. Principal components analysis analyzes the matrix of correlations among measured variables with 1.0 on the main diagonal and attempts to represent all of the variance of the observed variables (Floyd and Widaman, 1995). The Promax rotation method was preferred because the oblique method allowed factors to correlate and was more compelling than the orthogonal solution (Floyd and Widman, 1995; Conway and Huffcutt, 2003). Additionally, oblique rotation methods often produce more accurate results for research involving human behaviors (Williams, et al., 2012). Factor loadings of .50 or above were deemed practically significant (Hair, et al., 2006). Additionally, if a factor loaded on two constructs but the difference between the loadings was greater than .10 the factor was retained on the construct that had the greater factor loading (Snell and Dean, 1992).

Preliminary factor loadings indicated that HC4 did not load comfortably on the human capital construct, or any other construct, and was therefore deleted from final analysis. Additionally, OP6 was eliminated because of unfavorable cross loading on its intended construct and a second construct. Table 15 depicts factor loadings. Significant factor loadings are bolded.

Table 15: Factor Loadings

	Factor			
	1	2	3	4
HC1	0.00	0.05	**0.86**	-0.07
HC2	-0.05	0.00	**0.89**	-0.01
HC3	0.01	-0.03	**0.90**	-0.05
HC5	0.05	0.02	**0.62**	0.19
HC6	0.10	0.01	**0.74**	0.00
LO1	**0.69**	-0.09	0.11	0.00
LO2	**0.75**	0.01	0.09	0.01
LO3	**0.73**	0.02	0.04	0.05
LO4	**0.60**	-0.03	-0.03	0.21
LO5	**0.83**	0.05	-0.06	-0.01
LO6	**0.59**	0.02	0.01	0.12
LO7	**0.79**	0.12	-0.08	-0.05
KM1	0.32	-0.04	0.00	**0.67**
KM2	0.28	-0.01	0.02	**0.68**
KM3	0.27	0.08	0.01	**0.65**
KM4	-0.10	0.02	0.02	**0.94**
KM5	-0.10	0.05	-0.03	**0.91**
OP1	0.00	**0.82**	0.09	0.00
OP2	-0.04	**0.74**	0.08	0.17
OP3	-0.12	**0.83**	-0.04	0.10
OP4	0.05	**0.73**	-0.02	0.03
OP5	0.10	**0.79**	-0.06	-0.03
OP7	0.42	**0.55**	0.03	-0.21
Eigenvalues	9.54	2.48	1.76	1.41
Variance Extracted	41.50	10.79	7.64	6.11

Note: HC = Human Capital, LO = Learning Organization (Culture), KM = Knowledge Management, OP = Organizational Performance

Prior to extracting the factors the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were conducted. Suitability for factor extraction is dependent on a KMO index greater than .50 and a Bartlett's significance of less than .05 (Williams, et al., 2012). The KMO index was measured at .92 and the Bartlett's test proved significant at the .05 level, therefore the data were suitable for factor analysis. The number of factors retained was determined a priori based on formulation of the theoretical model with validated scales and was confirmed with Kaiser's "eigenvalues greater than one rule" (Conway and Huffcutt, 2003). Four factors were retained, including human capital, learning organization, knowledge management, and organizational performance. The eigenvalues are depicted above in Table 15.

Reliability and Validity.

Reliability "is the accuracy or precision of a measuring instrument and is a necessary condition for validity" (Hinkin, 1998). Construct reliability or internal consistency was measured via Cronbach's alpha. The generally agreed upon limit for Cronbach's alpha is .70 (Hair, et al., 2006). All four constructs had a Cronbach's alpha greater than .86 providing evidence of internal consistency reliability.

Convergent and discriminant validity was assessed via factor analysis using a technique similar to that of Grandon and Pearson (2004). Table 15 shows that all items have loadings greater than .50 and loaded stronger on their primary factors than others, illustrating both convergent and discriminant validity. Additional support for convergent validity can be seen by examining the squared multiple correlations of the factor loadings. All factor loadings were above Hair et al.'s (2006) recommended value of .50.

Consequently the squared multiple correlations between each item and their constructs were also high (Hsu, 2008), demonstrating convergent validity.

Specific threats to validity were assessed to determine their impact on this study. Incomplete surveys had no bearing on the statistics or conclusions dealing with the theoretical model because the entire usable sample was included in the model statistics. The percentage of respondents who answered the first section of the survey dealing with the theoretical model and abandoned the remainder, or a portion of the remainder, of the survey was 17.18%. If an individual did not answer every question in the survey they were not included in the results and conclusions for Investigative Questions 2 through 7. Non-response bias was measured by comparing the Likert scale data received in the first wave to that of the second wave as suggested by Rogelberg and Stanton (2007). Data from individuals who completed the survey between the initial contact and the second contact were compared against the data from the individuals who completed the survey between the second contact and the time the survey was closed. A comparison of the mean value for each construct between the two groups was performed via two-way t-tests. Results suggested no significant difference in means, indicating non-response bias is unlikely to be a threat to the validity of this study. Additionally, Harman's single factor test (Podsakoff and Organ, 1986) was utilized to determine if common method bias appeared to be problematic with this study. Analysis of the unrotated factor solution revealed four factors accounted for 66.04 percent of the variance collectively. Factor one accounted for 41.50 percent of the variance, factor two accounted for 10.79 percent, factor three accounted for 7.64 percent, and factor four accounted for 6.11 percent of the variance. As there was no factor that alone accounted for more than 50 percent of the

variance (Podsakoff and Organ, 1986), common method bias did not appear to be a problem.

Regression Assumption Checks.

Statistical inference via multivariate regression is predicated on satisfying the assumptions of multivariate analysis. If model assumptions are severely violated, tests of predictive significance cannot be trusted (Hair, et al., 2006). In the case of multiple linear regression, these assumptions include normality, independence, linearity, and homoscedasticity (constancy of error variance) (Hair, et al., 2006).

Normality.

According the Hair et al. (2006) the researcher should always use graphical plots and statistical tests to assess the actual degree of departure form normality. All three independent and the dependent variable were assessed for normality by creating histograms and normal probability plots. Figure 4 displays univariate histograms with a normal overlay of each variable. Aside from moderate skewness none of the variables substantially depart from normality. Figure 5 depicts normal probability plots for each variable. For normal distributions the observations should approximately follow the diagonal line. As depicted in Figure 5, the distribution of residuals around the trend line indicates approximate normality (Hair, et al., 2006).

According to Bollen et al., (2005) regression analysis is robust against non-normality and Norman (2010) points out that parametric methods are incredibly versatile and powerful. Hair et al. (2006) state that normality can have serious effects in sample sizes of 50 or less but the impact effectively diminishes when sample sizes reach 200 or

more. The sample size for this research was 542. For these reasons multiple linear regression is permissible for analysis of data gathered for this study.

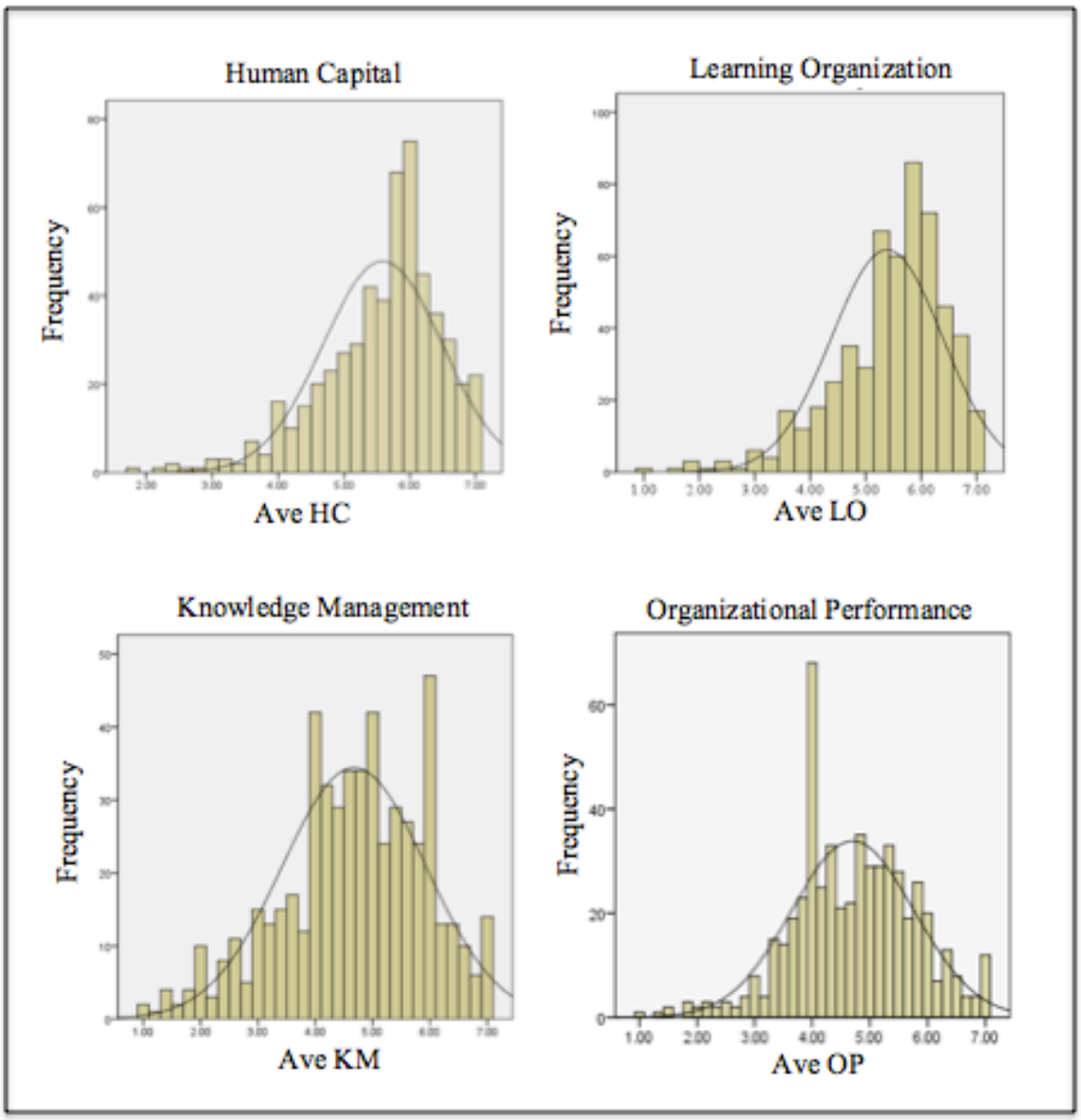

Figure 4: Histograms

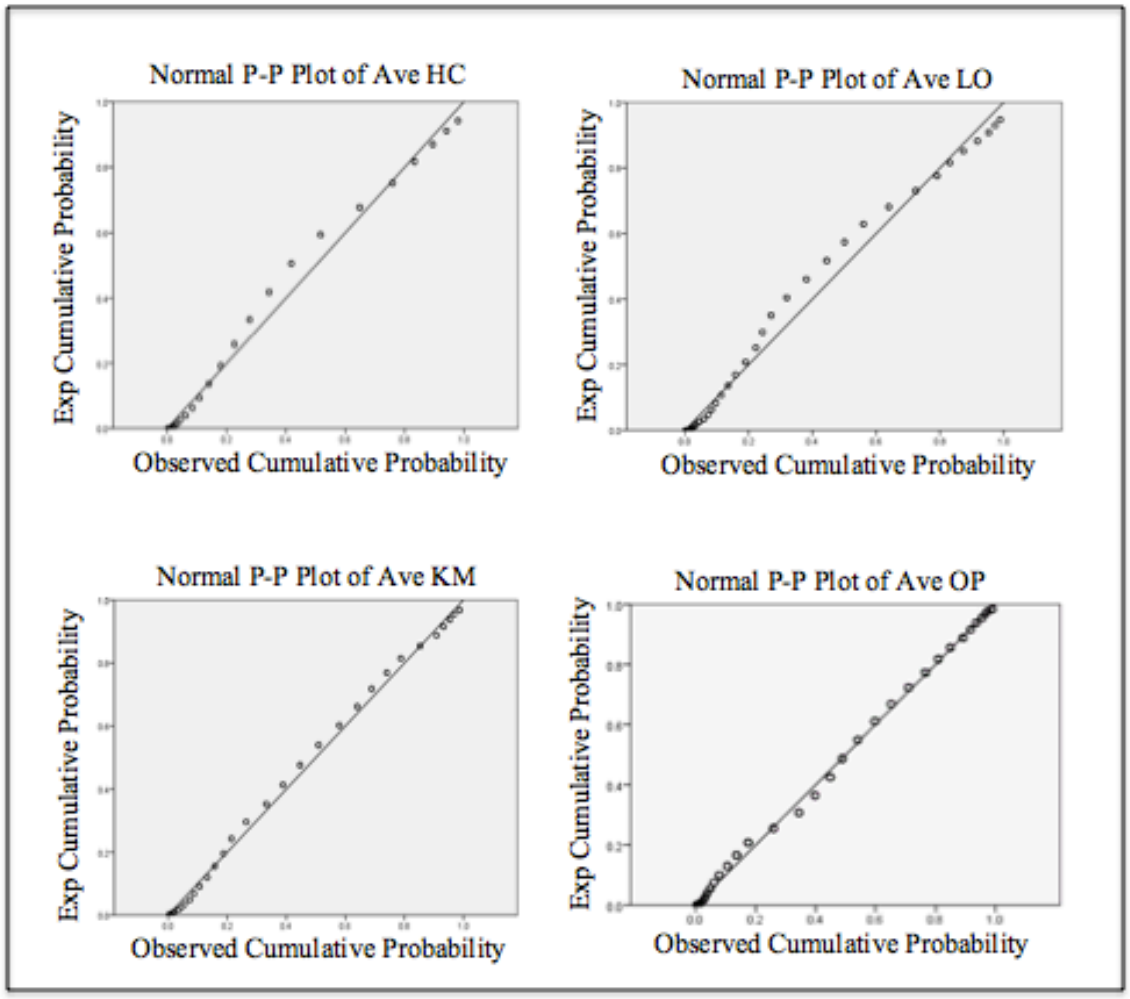

Figure 5: Normal Probability Plots

Independence.

The studentized residuals were used to check the independence assumption. There should be no practical reason why independence should not hold given that every individual should have completed the survey independently; nevertheless the

independence assumption was tested statistically with the Durbin-Watson coefficient. The Durbin-Watson coefficient was 1.84, which provides evidence at the .05 level of significance to support the assertion that the assumption of independence was not violated (Garson, 2012).

Linearity.

Plots of the residuals against each independent variable can help to determine whether the relationship between the independent variables and the dependent variable is linear, and therefore the suitability of linear regression (Hair, et al., 2006). Figure 6 illustrates plots of each of the independent variables against the residuals. Each plot displays residuals that generally fall within a horizontal band centered around zero with no systematic tendencies, providing evidence that the linearity assumption has been met.

Homoscedasticity.

The plot of the residuals against the fitted values from the model reveals that the model appears to meet the constancy of error variance assumption given that the residuals center around zero and display no systematic pattern. Figure 7 depicts the plot of residuals against the fitted values from the model.

Outliers.

The plot of the residuals against the predicted values (Figure 7) also illustrates the presence of some outliers. Examination of the data indicates that these outliers are not a result of erroneous data entry or any other mistaken value in the dataset. Given that data cleansing procedures were performed before running the multiple regression analysis

there is no practical reason to omit the outlying observations. The decision to retain the outliers was made to ensure the integrity of the data and results. Although inclusion of these outliers in the final model may slightly skew the results, these observations are valid with respect to the population of interest and deletion may result in unwanted bias of the results.

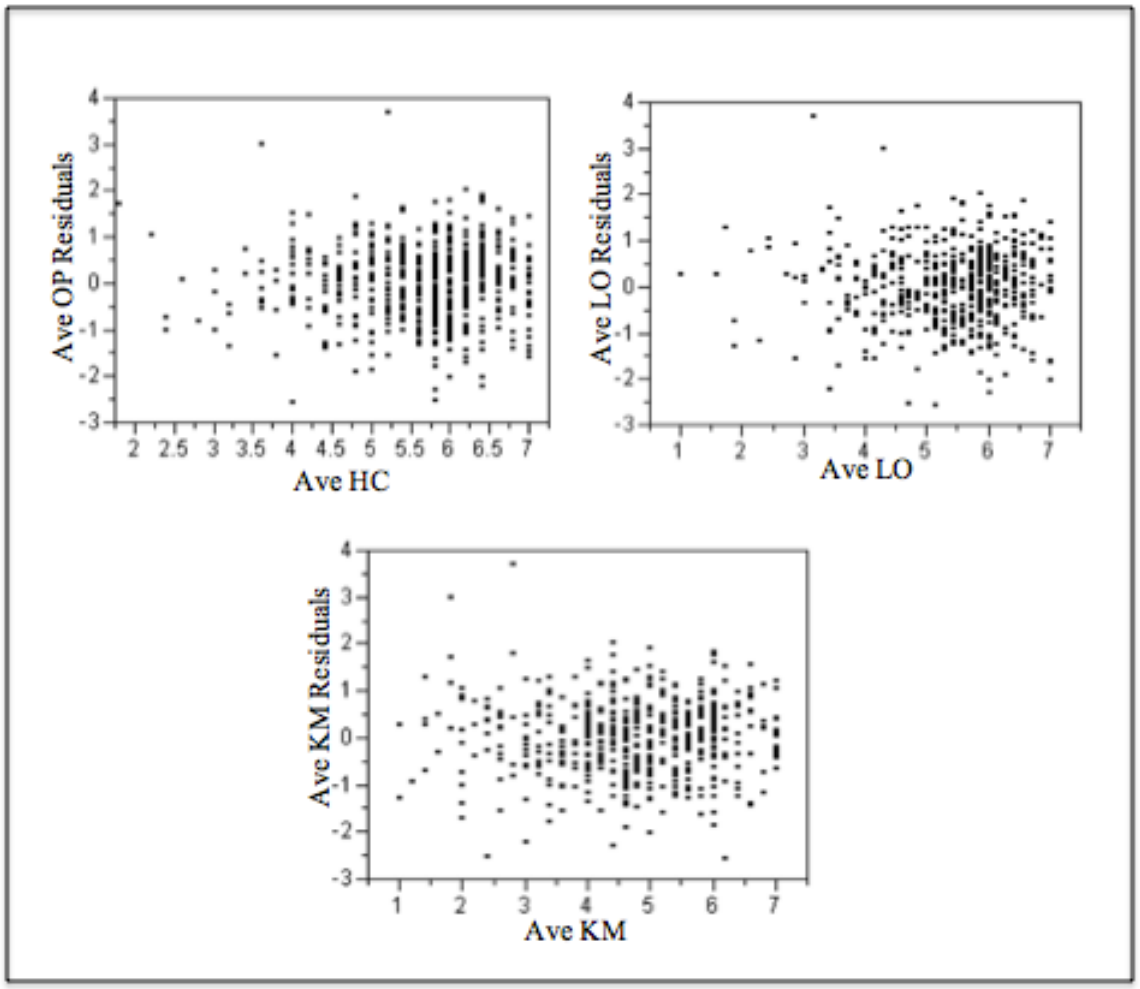

Figure 6: Residuals vs. Independent Variable Plots

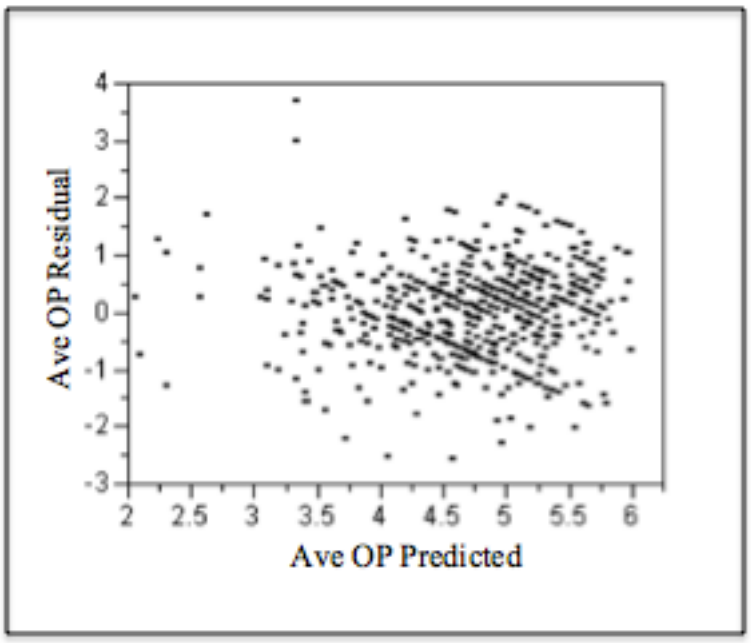

Figure 7: Residuals vs. Fitted Values

Multivariate Regression Results.

This study employed multivariate regression analysis to answer the first investigative question. After initial preparation of the data and appropriate assumption checks, data analysis was conducted using both JMP 10.0 and SPSS 18.0 software. Using multivariate regression the independent variables human capital, learning organization, and knowledge management were analyzed to determine which were statistically related to the dependent variable, organizational performance. The multivariate regression model proved significant at the $p < .001$ level ($F_{(4,538)} = 135.05$, $R^2 = .43$, Adjusted $R^2 = .43$). Results of the regression model are illustrated in Table 16 below.

Table 16: Multivariate Regression Results

Term	Estimate	Std Error	t Ratio	Significance	VIF
Intercept	0.47	0.24	1.93	0.05	
Ave HC	0.19	0.04	4.52	< .001	1.24
Ave LO	0.43	0.05	8.96	< .001	1.93
Ave KM	0.18	0.04	4.71	< .001	1.85

Notes: Values represent rounding to two decimal places.

The above results reveal some telling findings. The model was deemed significant at the $p < .001$ level indicating that at least one of the independent variables was significantly related to the dependent variable (Hair, et al., 2006). The t-Ratios and associated significance levels show that all three independent variables were significantly related to the dependent variable at the $p < .001$ level. The t-Ratios and associated significance levels show that all three independent variables were significantly related to the dependent variable at the $p < .001$ level.

Results of Hypothesis Testing.

The results of the multivariate regression analysis above provide the impetus for accepting or rejecting the hypotheses posed in this study. The theoretical model (Figure 8) and hypotheses posed in this study are reiterated as follows:

Hypothesis 1: LRO human capital has a positive impact on organizational performance

Hypothesis 2: LRO learning culture has a positive impact on organizational performance

Hypothesis 3: LRO KM has a positive impact on organizational performance

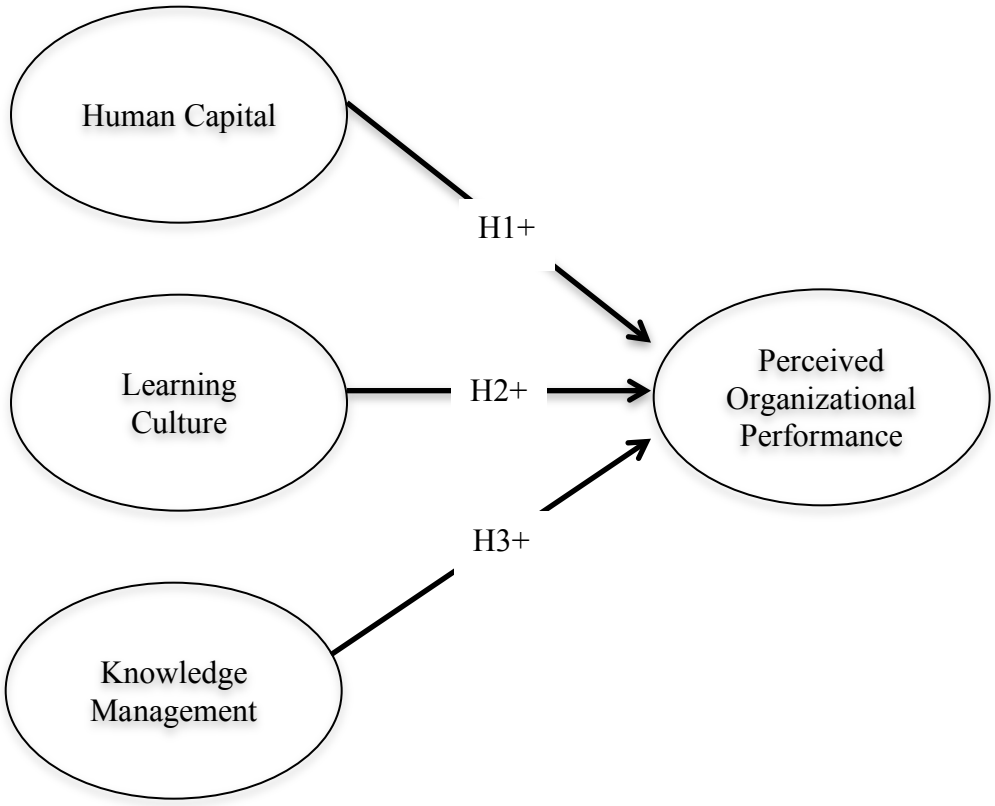

Figure 8: Theoretical Model

The results of hypothesis testing are explained in Table 17 below. Each hypothesis was supported at the $p < .001$ level indicating that LRO human capital, learning culture, and knowledge management all have a positive impact on perceived organizational performance.

Table 17: Results of Hypotheses

Hypothesis Number	Hypothesis	Support?	Significance	Beta
1	LRO human capital has a positive impact on organizational performance	Yes	< .0001	0.19
2	LRO learning culture has a positive impact on organizational performance	Yes	< .0001	0.43
3	LRO KM has a positive impact on organizational performance	Yes	< .0001	0.18

Investigative Question 2

Investigative Question 2 sought to determine the competencies for which LROs require proficiency. As portrayed in Chapter 2, there is myriad of guidance that dictates what logisticians need to be competent in. This study garnered specific competencies identified by the research sponsor to construct the survey questions designed to answer Investigative Question 3. Each competency included sub-competencies to provide LROs with examples so they could better answer investigative question three. A portion of the specific competencies, sub-competencies, and examples for which LROs require proficiency, as determined by the sponsor, are presented in Table 18 below. The complete table can be found in Appendix F. The *Supply* competency comprised six sub-competencies, the *Transportation* competency consisted of four sub-competencies, the *Planning* competency contained six sub-competencies, the *Joint* competency consisted of eight sub-competencies, the *Maintenance* competency comprised two sub-competencies, the *Deployment* competency consisted of five sub-competencies, the *Distribution* competency contained two sub-competencies, and the *Life Cycle Logistics* competency consisted of two sub-competencies. The verbiage presented to the participants of this study to guide them in answering proficiency questions about the competencies can be found in the survey instrument in Appendix C.

Table 18: Competencies, Sub-competencies and Examples

Competencies	Sub-competencies	Examples
Supply	Supplier Relationship Management	interaction with DLA or other sister service level vendor; evaluating suppliers based on performance indicators, e.g. on-time delivery rates, number of rejects, cycle time
	Sourcing & Procurement Strategy	deciding which suppliers to use to meet mission requirements while minimizing total cost; deciding on push or pull systems
	Inventory Planning	planning inventory requirements based on usage or consumption statistics
	Inventory Management	warehouse management activities to include issue/receipt, storage, inspection, etc.
	Material Disposition	disposing of assets to DRMS or deciding how best to dispose of material that has reached the end of its life cycle
	Return/Retrograde	reverse logistics; capture and disposition of downstream products from customers; retrograge of equipment from the AOR back to the US or other strategy
Transportation	Distribution Network Analysis	route optimization techniques to minimize total pipeline time
	Inbound/Outbound Transportation Management	receiving, shipping, proper inspection and documentation of inbound/outbound cargo
	Transportation Planning	selecting routes and transportation mediums, e.g. rail, truck, airplane, ship
	Transportation Marketplace Knowledge	understanding of what transportation mediums are available, cost of transportation mediums

Source: Department of the Air Force, 2013

Investigative Question 3

Investigative Question 3 used the results from Investigative Question 2 to assess how proficient LROs need to be in each of the identified competencies to do their current jobs. The levels of proficiency were obtained from AFDD 1-1 and included Basic, Intermediate, Proficient, Skilled, and Advanced. Participants were also given the option "N/A" if they felt that they did not need any level of proficiency in that particular

competency to perform their primary duties. Each competency was assessed by their sub-competencies on the Basic to Advanced scale, with the exception of Life Cycle Logistics. Participants were asked to indicate either "yes" or "no" if they required either of the certifications under the *Life Cycle Logistics* competency. A sample of the results of Investigative Question 3 can be found in Table 19 below. A complete table of the results is located in Appendix G.

Table 19: Required Proficiency Levels

Competency	Sub-competency	N/A	B	I	P	S	A
Supply	Supplier Relationship Management	91	86	66	105	97	65
	Sourcing & Procurement Strategy	102	103	52	112	78	63
	Inventory Planning	80	104	61	132	93	59
	Inventory Management	80	105	66	138	91	57
	Material Disposition	79	106	82	133	82	35
	Return/Retrograde	79	107	59	129	114	66
Transportation	Distribution Network Analysis	78	108	74	104	100	79
	Inbound/Outbound Transportation Management	79	109	80	105	101	73
	Transportation Planning	80	110	64	106	112	73
	Transportation Marketplace Knowledge	81	111	76	107	115	71

Notes: n = 510; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced

The results of investigative question three indicate that in the aggregate the duties LROs are required to perform require varying degrees of proficiency. Overall, within the Transportation competency, LROs indicated the need to have a skilled proficiency level in Transportation Marketplace Knowledge more than any other sub-competency.

Appendix G contains an alternative presentation of the data categorized by rank. For example, second lieutenants indicated that they require the most advanced proficiency in the Joint Capabilities, Development, Budgeting, and Acquisition sub-competency. The least applicable competency for second lieutenants was the Maintenance Operations competency. 28.8% of lieutenant colonels indicated the need to have a skilled proficiency level in the Deployment Strategy sub-competency.

Investigative Question 4

Investigative Question 4 looked at the available logistics courses that LROs could presently take advantage of. A list of specific courses was provided by the research sponsor and was used to construct the questions dealing with logistics courses in the survey. Appendix H contains the entire list of 89 courses that LROs were asked about. Of the 89 courses, 51 were Defense Acquisition University (DAU) courses, 25 were AFIT School of Systems and Logistics courses, and 13 were other logistics courses managed by various Air Force organizations. The method of delivery for these courses included traditional in-class instruction and distance learning. This study did not perform any analysis on the perceptions LROs may have regarding traditional in-class instruction versus distance learning, although it may have had a bearing on the results of Investigative Questions 5 and 6.

Investigative Question 5

The courses identified in Investigative Question 4 were used to determine which courses have allowed LROs to do their jobs better. Specifically, LROs were asked to indicate which of the 89 courses have allowed them to perform their primary duties

better, providing they have completed the courses. Table 20 provides a portion of the results of investigative question five. The complete table of results is located in Appendix I. The results provide a count of the number of LROs in each rank that found a particular course was of use to them on the job. Appendix I also contains a listing of other courses LROs have taken that have provided some use to them in their current job. Overall, the results suggest that LROs have not found as much utility in the DAU logistics courses as they have the AFIT School of Systems and Logistics, and other Miscellaneous courses.

Table 20: Logistics Courses with High Utility

Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
CLL001	0	2	13	18	10	4	47
CLL002	0	0	4	8	3	2	17
CLL003	0	0	1	4	1	1	7
CLL004	0	0	2	4	1	3	10
CLL005	0	0	2	4	6	0	12
CLL006	0	0	4	2	1	1	8
CLL007	0	0	0	1	0	0	1
CLL008	0	1	9	14	5	0	29
CLL011	0	0	12	14	12	3	41
CLL012	0	0	6	6	6	0	18
CLL013	0	0	1	2	1	1	5
CLL014	0	0	0	1	1	0	2

n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n = 111 for Lt Col, n = 35 for Col; "Other" courses are listed separately

Investigative Question 6

Investigative Question 6 sought to determine among the courses LROs have not taken, which they feel may have allowed them to do their jobs better. The respondents were asked to indicate which of the 89 courses that they had not taken might have

allowed them to perform their duties better. A portion of the results follows in Table 21, the complete table of results can be found in Appendix J. The results suggest that LROs feel many of the courses would be of some utility in their current jobs. Appendix J also contains a listing of other courses LROs identified may be of some use to them in their current job.

Table 21: Logistics Courses with Potential Utility

Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
CLL001	7	17	26	19	14	4	87
CLL002	7	9	25	13	10	5	69
CLL003	2	3	3	3	2	2	15
CLL004	6	15	26	16	14	2	79
CLL005	1	7	17	8	6	1	40
CLL006	3	5	20	10	7	6	51
CLL007	0	3	3	3	1	0	10
CLL008	0	4	5	6	7	2	24
CLL011	1	5	23	8	18	3	58
CLL012	3	7	9	11	9	4	43
CLL013	5	6	8	7	4	2	32
CLL014	1	8	17	14	12	1	53

n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n = 111 for Lt Col, n = 35 for Col; "Other" courses are listed separately

Figures 9, 10, and 11 illustrate combined aggregated results of Investigative Questions 5 and 6. Figure 9 displays aggregate counts of DAU courses, Figure 10, displays aggregate counts of AFIT School of Systems and Logistics courses, and Figure 11 displays aggregate counts of the non-DAU and non-AFIT logistics courses. The stacked bar charts of logistics courses offer a visual representation of the courses LROs feel have provided them high utility in their current jobs as well as the courses LROs feel have potential utility as they carry out their current duties. The findings can be

interpreted such that courses below combined counts of 100 have low actual or potential utility. This means that less than 20% of LROs feel that the course has either provided them some benefit in their current job or has the potential to provide them some benefit in their current job. Several logistics courses have combined counts less than 100 and may be prime candidates for elimination from the portfolio of courses LROs are recommended to take.

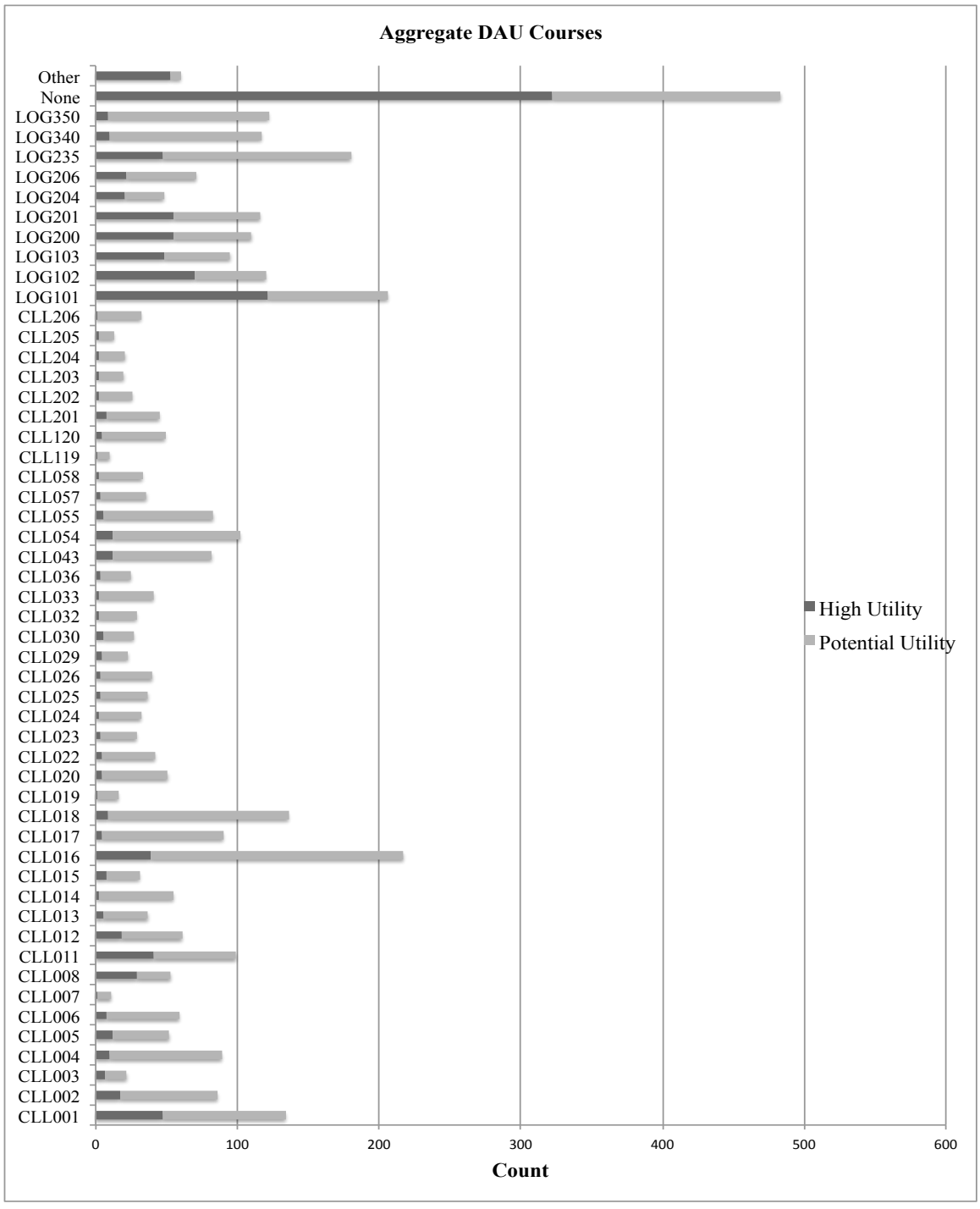

Figure 9: Aggregate Counts of DAU Courses

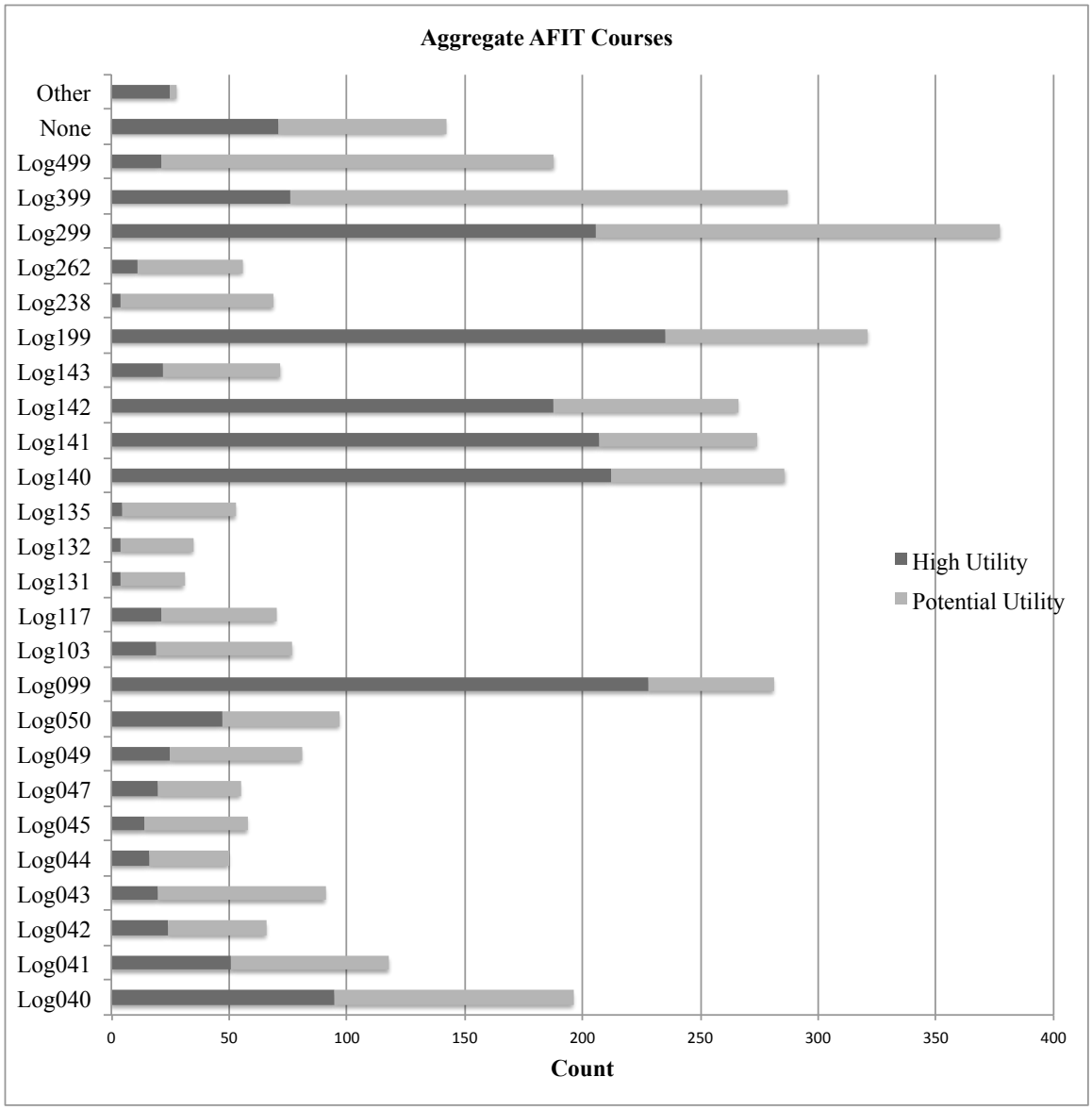

Figure 10: Aggregate Counts of AFIT School of Systems and Logistics Courses

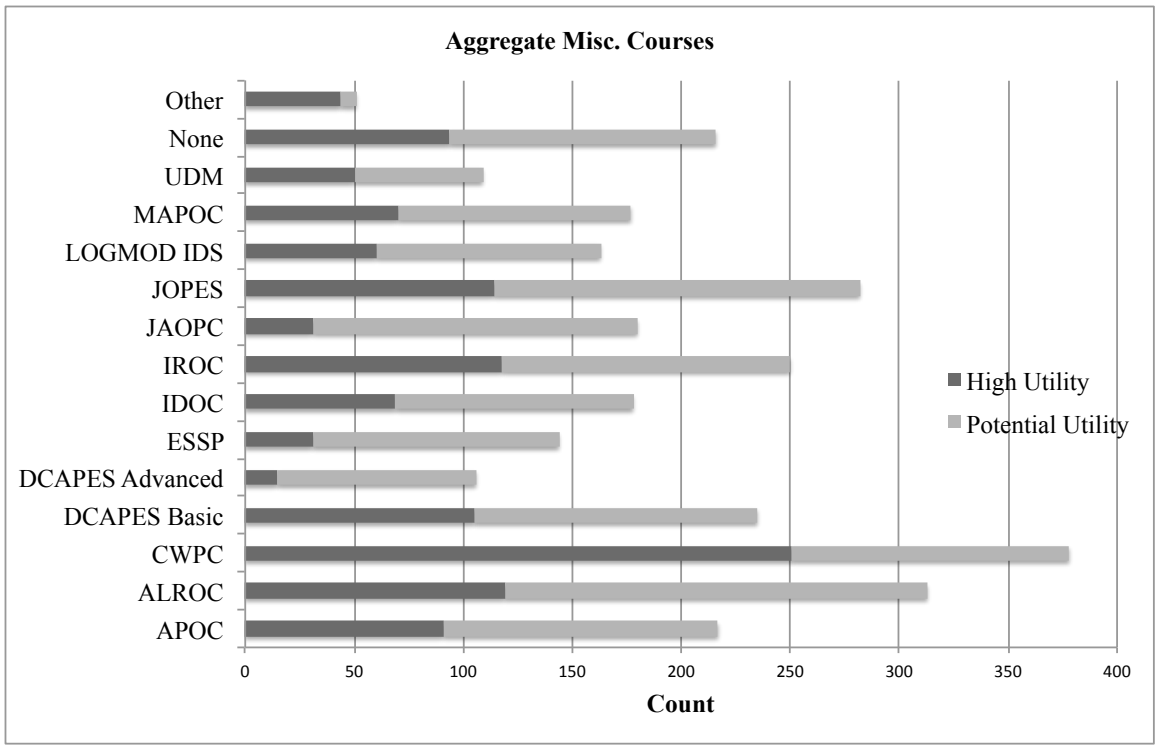

Figure 11: Aggregate Counts of Miscellaneous Logistics Courses

Investigative Question 7

The billets that LROs currently fill can be classified as tactical, operational, or strategic; as such, Investigative Question 7 asked LROs to classify their current jobs accordingly. The option "Not Sure" was available if the respondents did not know how to classify their current duties. The results of investigative question seven are portrayed in Table 22 below. Overall, the majority of LROs categorized their current duties as operational with CGOs indicating more of a tactical focus and FGOs designating their duties as more operational and strategic. The percentage of LROs unsure about how to classify their duties under the prescribed taxonomy was 4.5%. Figure 12 presents a visual depiction of the results.

Table 22: LRO Duty Taxonomy

	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
Tactical	40.0%	51.5%	32.1%	19.1%	19.8%	11.4%	28.2%
Operational	53.3%	38.2%	42.9%	47.3%	28.8%	25.7%	39.6%
Strategic	0.0%	7.4%	20.5%	28.2%	45.9%	62.9%	27.6%
Not Sure	6.7%	2.9%	4.5%	5.5%	5.4%	0.0%	4.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

n = 510: 2d Lt = 30, 1st Lt = 68, Capt = 156, Maj = 110, Lt Col = 111, Col = 35

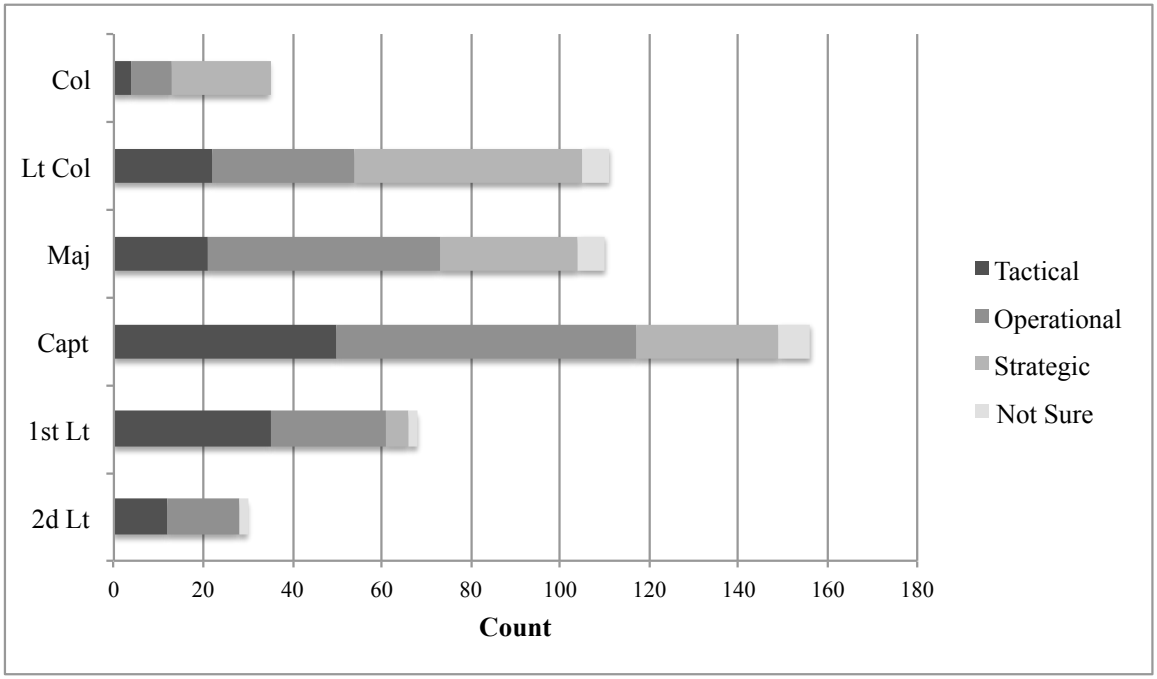

Figure 12: LRO Duty Taxonomy

Summary

This chapter presented the analyses and results of the seven investigative questions posed in Chapter 1, beginning with a description of the pertinent demographics of the survey respondents. Investigative Question 1 sought to examine the relationship between LRO human capital, learning culture, and knowledge management, and organizational performance. An EFA was conducted and the reliability and validity of the scales used to measure each latent construct were deemed adequate. The assumptions of multivariate regression were checked for each of the independent variables and the dependent variable. The results of the multivariate regression indicated that the three independent variables were all positively related to the dependent variable, corroborating the hypotheses posed in Chapter 3. LRO human capital, learning culture, and knowledge management all had statistically significant positive relationships with organizational performance.

The findings for Investigative Questions 2 through 7 offer insight into how LROs perceive competency proficiency requirements for their current jobs, the utility and potential utility of available logistics courses, and how LROs classify their current duties in terms of tactical, operational, or strategic. Overall, LROs require varying degrees of proficiency in each competency with CGOs having more of a tactical focus and FGOs having more operational and strategic duties. LROs generally found some logistics courses to have more actual and potential benefit to them as they fulfill their current responsibilities. Some logistics courses were considered to be less useful and could be candidates for elimination from the portfolio of courses LROs are recommended to take.

V. Conclusions and Recommendations

Conclusions

The findings of this study offer both theoretical and practical insight for the research sponsor. Additionally, the findings add to an existing body of resource-based knowledge. Four latent constructs were measured through a web-based cross-sectional survey. The results supported the theoretical relationships between LRO human capital, learning culture, and knowledge management, and organizational performance. Exploratory factor analysis and multivariate regression corroborated the proposed theoretical model and validated the three hypotheses posed in this study. Other data was garnered through survey methodology aimed at answering six interrelated investigative questions that have practical implications for LRO development.

The results suggest that taking a resource-based approach to the management of LRO human capital can potentially yield higher returns in organizational performance. The link between human capital and organizational performance is not new, as demonstrated by Hsu (2008) and Delaney and Huselid (1996); however, this study may very well be one of the first to substantiate such results in a military setting. Under the notion that LRO human capital is seen as a strategic resource it can become a source of competitive advantage provided that it is valuable, rare, inimitable, and supported by the organization (Barney, 1991; Ployhart and Moliterno, 2011). To achieve value, rarity, inimitability, and support this research suggests that sound knowledge management practices and a strong learning culture can be driving forces for decisions regarding human capital management, with the ultimate goal of increasing organizational

performance. If one argues that by optimizing the performance of each individual organization the Air Force becomes increasingly optimal then the findings of this study offer substantial appeal for senior leaders. As the results of this research have demonstrated, human capital, knowledge management, and learning culture have positive impacts on organizational performance in the LRO context. To be a source of competitive advantage, knowledge must be successfully applied toward organization-enhancing activities. It is the application of the collective stock of LRO knowledge that will create value for entire logistics enterprise. Such knowledge application will be either be enabled by a culture that values learning or stymied by a culture that does not value learning (Gold, et al., 2001). The synergistic interdependency between knowledge management and learning culture means that efforts aimed at improving one without the other will sub-optimize any potential competitive advantage. Leaders who aim to improve the state of Air Force logistics and supply chain management practices should consider the influence that learning culture, knowledge management practices, and human capital can have toward achieving such goals. The potential benefits demonstrated by this research have implications for the Air Force as a whole. The supply chain has become a new domain for inter-organizational competition. As such, effective supply chain management has become a valuable way of securing competitive advantage and improving the performance of the Air Force (Li, et al., 2006).

In a more practical and actionable sense, force development initiatives such as the DCoL can be seen as an investment in LRO human capital. The DCoL is purported to be a "purposeful education and training roadmap that supports career path progression" (Department of the Air Force, 2013). Under this framework, eight logistics competencies

consisting of 35 sub-competencies were examined, along with 89 relevant logistics courses currently providing education and training to LROs. This study found proficiency requirements for the 35 sub-competencies currently required of LROs, as well as the utility, and potential utility of the 89 logistics courses. Additionally, this research gathered information about how LROs classify their current duties under the prescribed taxonomy of tactical, operational, or strategic. All of this information allowed for interpretation as to how the DCoL could improve its investment in LRO human capital and knowledge management practices while supporting and encouraging a culture that values learning. Actions directed toward achieving these objectives can theoretically enhance LRO organizational performance across the logistics enterprise.

The results of the competency proficiency analysis paint a realistic picture of the proficiency requirements facing today's LRO workforce within the scope of the 35 sub-competencies. This information can be used to tailor education and training material such that it meets the needs of today's LRO. For example, in the Supplier Relationship Management sub-competency 73.5% of first lieutenant LROs indicated needing less than a *skilled* proficiency level to perform their current duties. The current portfolio of logistics courses recommended to LROs may be a little excessive given that this research found several courses to be of low utility, or low potential utility. There were, however, some courses that received high ratings. A disproportionately high amount of LROs indicated that the Contingency Wartime Planners Course (CWPC), Advanced Logistics Readiness Officers Course (ALROC), Installation Deployment Officer Course (IDOC), Log 199 (Introduction to Logistics), Log 299 (Combat Logistics), Log 399 (Strategic Logistics Management), and various joint centric courses have either benefitted them, or

have the potential to benefit them on the job. Results from this research provide good evidence for recommendations and suggestions on how to shape deliberate force development practices.

Recommendations

The recommendations that follow spawned from the results of the seven investigative questions posed in this thesis. In a general sense, special attention should be paid to the relationship between human capital, learning culture, and knowledge management, and organizational performance. Deliberate force development practices should be geared toward improving the state of Air Force logistics and supply chain management by investing smartly in LRO human capital.

Given current fiscal constraints, excessive expenditure on underutilized logistics courses should not be standard practice. Courses that LROs have indicated do not provide high utility, or potential utility, should potentially be eliminated from the portfolio of logistics courses LROs are recommended to take. Specifically, the DAU and AFIT School of Systems and Logistics courses that received less than 100 combined counts of usefulness or potential usefulness are reasonable candidates for evaluation of curriculum relevance and redundancy. There are potential cost savings to be had by evaluating the content of current logistics courses, combining where necessary, and eliminating redundancies. Courses that received counts of combined usefulness and potential usefulness greater than 100 should be advertised to LROs and other Air Force logistics personnel with particular attention paid to logisticians at key milestones in their career or in critical positions. Logistics courses should be geared toward providing LROs

with the KSAs necessary to meet competency proficiency requirements. The results of Investigative Question 3 can be used to tailor specific logistics courses to meet LROs' proficiency needs. Many LROs indicated the need for more joint oriented education and training to help them in the performance of their primary duties. CLL 016 (Joint Logistics), CLL 054 (Joint Task Force Port Opening) and CLL 055 (Joint Deployment and Distribution Performance Metrics Framework) all received high potential utility ratings from LROs. These recommendations align with sound knowledge management practices and smart human capital investment.

A notional example using estimated budget and cost data illustrates the potential economic benefits to be had by capitalizing on the results of this study. Several researchers have highlighted the positive impact of human capital, knowledge management, and learning culture, on financial measures of organizational performance (e.g. Huselid, et al., 1997; Blundell, et al., 1999; Ellinger, et al., 2002; Hatch and Dyer, 2004; Skerlavaj, et al., 2006; Zack, et al., 2009). As a non-profit maximizing organization, the Air Force is concerned about efficient utilization of budget appropriations rather than market share or shareholder return. In fiscal year (FY) 2013 the Air Force received approximately $235 million for professional development education (Department of the Air Force, 2013) with which to provide professional military education and professional continuing education. Under the auspices of professional continuing education falls courses like the ones presented in this study: namely the DAU and AFIT School of Systems and Logistics courses. At a cost of approximately $5K per AFIT in-residence continuing education logistics course (Bailey, 2014) offering the Air Force could save upwards of $60K annually for each course that is

identified as having low utility to logisticians by either consolidating or discontinuing the course. AFIT continuing education logistics courses provided via distance learning have an estimated cost of $400 per course offering (Bailey, 2014); discontinuing or consolidating low utility distance learning courses could save approximately $6K per course per year. Fifteen AFIT School of Systems and Logistics courses had combined utility counts less than 100. The range of cost savings per year by eliminating or consolidating these courses is estimated to be between $90K and $900K. The funds not expended on low utility logistics courses could be reallocated to other priorities. While the findings of this study have allowed for several recommendations a discussion of the limitations of this research is warranted.

Limitations

Every research endeavor has limitations and this study is no exception. The survey method chosen for this study presents limitations by introducing sources of bias into the research effort. The possible sources of bias include common method bias, non-response bias, and coverage error. Non-response bias occurs when respondents do not answer every question in a survey or when they do not provide any data at all (Fowler, Jr., 2009). Common method bias can arise from having a common rater, common measurement context, a common item context, or from the characteristic of the items themselves (Podsakoff, et al., 2003). Coverage error occurs from every unit in a survey population not having a known chance of being included in the sample (Dillman, 2007). Although attempts were made to mitigate the effect of each source of bias on this research it is likely some bias still exists. However, appropriate tests for each source of

bias provided sufficient evidence that the results presented herein were not significantly affected by non-response bias, common method bias, or coverage error.

The cross-sectional nature of this study prevented exploration into the latent constructs over time and the data that was gathered may be less generalizable as time passes. Additionally, other conclusions may have been reached had the study included all Air Force logistics officers, and perhaps Air Force civilian logisticians. Another limitation was the inability to contact every single LRO via email. In addition, the length of the survey was a limitation. Had the survey been more robust this study could have gathered more data with which to make assertions about the LRO career field and force development practices. Increasing the number of latent variables may have explained more of the variance in organizational performance and provided more theoretical insight into the antecedents to organizational performance.

The concept of competitive advantage and how it relates to the Air Force is somewhat unclear. Having a clear definition of what constitutes competitive advantage for the Air Force would help alleviate the confusion that arises when asserting that competitive advantage can be improved through various activities and initiatives.

Future Research Opportunities

Future research may include different populations of logisticians to make better generalizable statements about the entire domain of logistics professionals. Obtaining course curriculum and cost information would allow for a better examination of the concepts that are either missing or redundant and the potential cost savings of consolidating or eliminating courses.

Taking a structural equation modeling methodological approach could offer more insight into the relationships between human capital, learning culture, knowledge management, and organizational performance. Understanding the interrelationships between each of the latent variables would be useful for Air Force logistics senior leaders as they make decisions regarding force development programs and policies.

Summary

This research makes several contributions toward advancing scholarly understanding of the antecedents to organizational performance. Multivariate regression showed that human capital, learning culture, and knowledge management account for roughly 45% of the variance in organizational performance. Extensions are made to the RBV theory of the firm by substantiating the fact that investments in human capital offer opportunities for sustained competitive advantage via increased organizational performance. Investments in sound knowledge management practices and a strong learning culture support previous research claiming a link between such investments and organizational performance (e.g. Hsu, 2008; Ellinger, et al., 2002). The implications of this research extend beyond satisfying the research sponsor's goals. The human capital, learning organization, and knowledge management body of knowledge is enhanced by making the extension to military logistics personnel. The door is wide open for other endeavors to explore the antecedents and consequences of human and organizational behavior in a military setting.

Appendix A. IRB Approval Letter

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OHIO

25 September 2013

MEMORANDUM FOR LT COL BEN SKIPPER

FROM: William A. Cunningham, Ph.D.
AFIT IRB Research Reviewer
2950 Hobson Way
Wright-Patterson AFB, OH 45433-7765

SUBJECT: Approval for exemption request from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) for 21R competencies, proficiencies, human capital, learning culture, knowledge management, and perceived organizational performance.

1. Your request was based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) (2) Research activities that involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

2. Your study qualifies for this exemption because you are not collecting sensitive data, which could reasonably damage the subjects' financial standing, employability, or reputation. Further, the demographic data you are collecting cannot realistically be expected to map a given response to a specific subject.

3. This determination pertains only to the Federal, Department of Defense, and Air Force regulations that govern the use of human subjects in research. Further, if a subject's future response reasonably places them at risk of criminal or civil liability or is damaging to their financial standing, employability, or reputation, you are required to file an adverse event report with this office immediately.

//signed//
WILLIAM A. CUNNINGHAM, PH.D.
AFIT Research Reviewer

Appendix B. SCN Approval Letter

7 November 2013

MEMORANDUM FOR Air Force Institute of Technology
ATTENTION: LT COL JOSEPH SKIPPER

FROM: AFPC/MAPP
550 E Street East, Suite 116
Randolph AFB TX 78150-4451

SUBJECT: Survey Approval – Logistics Readiness Officer's Survey.

1. The survey is approved for use with the following population(s):

Population:	Number(s):
Air Force Active-Duty Officers	1,5000
Air Force Active-Duty Enlisted	0
Air Force Civilians	0
Air Force Retirees and/or AF Family Members	0
Total Number to be Surveyed	1,500

The Survey Control Number **(SCN)** for this effort is AF13-209AFIT. This SCN is valid from 02Dec 2013 through 31 Dec 2013.

Please ensure compliance with the following guidance, as applicable, while administering your survey.

a. Invitations to participate in the survey must include:

(1) Survey title (as shown in the subject line of this memo).

(2) AF Survey Control Number (SCN).

(3) Statement that completion of the survey is voluntary.

(4) Link to the list of Air Force approved surveys: https://www.my.af.mil/gess-af/USAF/ep/browse.do?programId=t2D8EB9D6297405FA012980243147010A&channelPageId=s5FDEA9F02134FFA70121351677C80048

(5) Government contact name or office, with official contact information (e.g., e-mail address, telephone number, etc.), to provide a point of contact for questions about the survey.

(6) Identifying information of the survey's sponsor, to inform survey recipients under whose authority the survey is being conducted.

(7) All AF attitude and opinion surveys must include the following statement on the questionnaire: "We cannot provide confidentiality to a participant regarding comments involving criminal activity/behavior, or statements that pose a threat to yourself or others. Do NOT discuss or comment on classified or operationally sensitive information."

b. This approval is exclusive to the Air Force community and does not constitute authority for administration to individuals from other federal agencies, sister services, etc. Surveys that include individuals from outside the Air Force community must be coordinated through the DOD/WHS/ESCD Information Management Division (commercial phone 703-696-5284).

c. The organization conducting this survey must contact the Civilian Personnel Office; Civilian Personnel Element, Manpower & Personnel Flight; for labor union notification prior to releasing this survey if any participants are civilian employees of a bargaining unit. If this survey involves bargaining unit civilians at more than one base, the organization conducting this survey must notify HQ AFPC/DPIECC, Air Force Program Management and Evaluation.

d. The organization conducting this survey must insure that if this survey requires any changes, request must be submitted to the Survey Office for review and approval prior to implementation in accordance with AFI 38-501.

e. This survey does/does not require review by an Air Force Institutional Review Board. If this survey requires an IRB, the PI must submit all proposed survey changes to the Survey and IRB Office for review and approval (minor changes do not require a change of SCN number) prior to implementation in accordance with AFI 38-501.

f. AFI 33-129, Web Management and Internet Use, paragraph 3.2.5.; 3.7.4, and 3.7.5; Please contact SAF/XCDIG, 1800 Air Force Pentagon, Washington DC 20330-1800, for further guidance details which requires that all websites hosted in the commercial environment (i.e., ".com", ".org", etc.) receive SAF/A6 approval. The organization conducting this survey must coordinate with SAF/A6 (e-mail address A3CS.A6CSStrategy@pentagon.af.mil) for approval of a waiver if the survey will be hosted on any website other than a ".mil" account. If a waiver is required, it must be granted by SAF/A6 prior to administration of the survey.

g. For information regarding digital certification of e-mails, refer to AFI 33-119, *Air Force Messaging*. The reference for PK enabling (PKE) information is https://afpki.lackland.af.mil/html/pkenabling.cfm. For information pertaining to ".mil" accounts, the reference is https://afpki.lackland.af.mil/html/help_desk.cfm. Information for systems that are not ".mil" can be found at http://iase.disa.mil/pki/eca/. For information on External Certificate Authority or to contact a representative, the reference is http://iase.disa.mil/pki/eca/contact_us.html.

h. The organization conducting this survey must ensure its Operations Security (OPSEC) manager reviews this survey prior to administration. References for the OPSEC Program include: DOD Directive 5205.02, *DOD Operations Security Program*; Joint Publication 3-13.3, *Operations Security*; AFPD 10-7, *Air Force Information Operations*; and AFI 10-701, *Operations Security (OPSEC)*.

i. The public may request survey results under provisions of the Freedom of Information Act (FOIA). Results released outside the Air Force require coordination with Air Force Public Affairs prior to dissemination.

j. Data collected under this survey may be subject to the Privacy Act of 1974. Please ensure compliance with this act as set forth in Title 5 United States Code (USC), Sec 552a; Title 10 USC, Sec 55 and 8013; Executive Order 9397; and Air Force Instruction 33-332, *Privacy Act Program*.

2. If you have any questions, please call the Air Force Survey Office at DSN 487-5332 or send an e-mail to af.survey@us.af.mil.

//Signed//
RENEE TEALER
Management Analyst
Air Force Survey Office

Appendix C. Survey Instrument

AFIT Study: LRO Survey (Survey Control Number AF13-209AFIT)

Survey Description

PURPOSE: The purpose of this survey is to assess your opinion of how much you use a particular competency in your current job and to assess your perception of LRO human capital, learning culture, knowledge management, and organizational performance in your organization (squadron or equivalent). The results of this survey will aid the Director of Logistics at the Pentagon (AF/A4L) in assessing the current state of the LRO career field and may be used to better develop LROs.

CONFIDENTIALITY: All answers will be kept strictly confidential. In no way will the information you provide be used to determine who you are. The demographic information is valuable to this research and will only be used in analysis of the results. No one other than the research team will see your responses. Group trends and statistical findings may be published and briefed to leadership personnel as part of this research.

PARTICIPATION: Participation is strictly voluntary. You are not required to participate in this survey. This survey should take approximately 15 to 20 minutes to complete. You may exit this survey and return to it at any time if you do not finish on your first attempt.

INSTRUCTIONS:

- Please base your answers on your own thoughts and experiences
- Please make your answers clear and concise when asked to answer in a response or when providing comments
- Be sure to select the correct option button when asked
- Thank you for your participation in this survey

CONTACT: If you have questions about this survey please contact matt.cherry@afit.edu.

*NOTE: If you are not a Logistics Readiness Officer or you have already completed this survey please exit now.

17%

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AFIT Study: LRO Survey (Survey Control Number AF13-209AFIT)

Organizational Questions

This section will be used to gather information about your perceptions of the LRO human capital, learning culture, and knowledge management practices of your organization (squadron or equivalent), as well as your perception of your organization's (squadron or equivalent) overall performance.

1. Human Capital: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) LROs.
*** Human Capital is defined as the knowledge, skills, attitudes, and abilities possessed by individuals.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
Our LROs are very intelligent	○	○	○	○	○	○	○
Our LROs are very creative	○	○	○	○	○	○	○
Our LROs are very talented	○	○	○	○	○	○	○
Our LROs are specialized in their jobs	○	○	○	○	○	○	○
Our LROs are producing new ideas and knowledge	○	○	○	○	○	○	○
Our LROs are best performers	○	○	○	○	○	○	○

2. Learning Culture: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) learning culture.
*** Learning Culture is defined as the value the organization places on learning.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
In my organization, people are rewarded for learning	○	○	○	○	○	○	○
In my organization, people spend time building trust with each other	○	○	○	○	○	○	○
In my organization, teams/groups revise their thinking as a result of group discussions or information collected	○	○	○	○	○	○	○
My organization makes its lessons learned available to all employees	○	○	○	○	○	○	○
My organization recognizes people for taking initiative	○	○	○	○	○	○	○
My organization works together with the outside community (other organizations/squadrons/or equivalent) to meet mutual needs	○	○	○	○	○	○	○
In my organization, leaders ensure that the organization's actions are consistent with its values	○	○	○	○	○	○	○

3. Knowledge Management: On a scale from 1 (Strongly Disagree) to 7 (Strongly Agree) please indicate your level of agreement with the following statements that pertain to your organization's (squadron or equivalent) knowledge management practices.
*** Knowledge is defined as the awareness or familiarity gained by a fact or situation.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
Our organization has processes for integrating different sources and types of knowledge	○	○	○	○	○	○	○
Our organization has processes for converting competitive intelligence into plans of action	○	○	○	○	○	○	○
Our organization has processes for taking advantage of new knowledge	○	○	○	○	○	○	○
Our organization has processes for acquiring knowledge about business partners	○	○	○	○	○	○	○
Our organization has processes for exchanging knowledge with our business partners	○	○	○	○	○	○	○

4. Organizational Performance: On a scale from 1 (Much Worse) to 7 (Much Better) how would you compare your organization's (squadron or equivalent) performance over the past 3 years to that of other organizations that do the same kind of work? What about in relation to...

	Much Worse	Worse	Slightly Worse	Neutral	Slightly Better	Better	Much Better
Quality of products, services, or programs?	○	○	○	○	○	○	○
Development of new products, services, or programs?	○	○	○	○	○	○	○
Ability to attract essential employees?	○	○	○	○	○	○	○
Ability to retain essential employees?	○	○	○	○	○	○	○
Satisfaction of customers or clients?	○	○	○	○	○	○	○
Relations between management (leadership) and other employees?	○	○	○	○	○	○	○
Relations among employees in general?	○	○	○	○	○	○	○

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AFIT Study: LRO Survey (Survey Control Number AF13-209AFIT)

Competency and Proficiency Information

This section aims to assess how proficient you need to be in each of 8 competencies to perform your primary duties.

* The 8 competencies were provided by AF/A4LF and include: (1) Supply, (2) Transportation, (3) Planning, (4) Joint, (5) Maintenance, (6) Deployment, (7) Distribution, (8) Life Cycle Logistics. These competencies are relevant to the 21X community and you may or may not use some of them in your job. These competencies have been vetted through senior Air Force logistics leaders with the expectation that Air Force logisticians will acquire proficiency in these competencies as they progress through their careers.
* The levels of proficiency are extracted from AFDD 1-1 and include: (1) Basic, (2) Intermediate, (3) Proficient, (4) Skilled, and (5) Advanced where (1) Basic is introductory-level and (5) Advanced is enterprise-level.
* N/A means you do not need any level of proficiency in that particular competency to perform your primary duties.

5. Please indicate how proficient you need to be in the Supply competency to perform your primary duties. Supply includes areas such as: Supplier Selection & Contract Management; Supplier Relationship Management; Sourcing & Procurement Strategy; Inventory Planning; Inventory Management; Material Disposition; Return/Retrograde.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Supplier Relationship Management – interaction with DLA or other service level vendor; evaluating suppliers based on performance indicators, e.g. on-time delivery rates, number of rejects, cycle time	○	○	○	○	○	○
Sourcing & Procurement Strategy – deciding which suppliers to use to meet mission requirements while minimizing total cost; deciding on push or pull systems	○	○	○	○	○	○
Inventory Planning – planning inventory requirements based on usage or consumption statistics	○	○	○	○	○	○
Inventory Management – warehouse management activities to include issue/receipt, storage, inspection, etc.	○	○	○	○	○	○
Material Disposition – disposing of assets to DRMS or deciding how best to dispose of material that has reached the end of its life cycle	○	○	○	○	○	○
Return/Retrograde – reverse logistics; capture and disposition of downstream products from customers; retrograde of equipment from the AOR back to the US or other strategy	○	○	○	○	○	○

6. Please indicate how proficient you need to be in the Transportation competency to perform your primary duties. Transportation includes areas such as: Distribution Network Analysis; Inbound/Outbound Transportation Management; Transportation Planning; Transportation Marketplace Knowledge.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Distribution Network Analysis – route optimization techniques to minimize total pipeline time	○	○	○	○	○	○
Inbound/Outbound Transportation Management – receiving, shipping, proper inspection and documentation of inbound/outbound cargo	○	○	○	○	○	○
Transportation Planning – selecting routes and transportation mediums, e.g. rail, truck, airplane, ship	○	○	○	○	○	○
Transportation Marketplace Knowledge – understanding of what transportation mediums are available, cost of transportation mediums	○	○	○	○	○	○

7. Please indicate how proficient you need to be in the Planning competency to perform your primary duties. Planning includes areas such as: Demand Forecasting; Network Optimization; Requirements Planning (Deployment); Distribution Requirements Planning; Adaptive Planning; Sustainment Planning.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Demand Forecasting – employing quantitative forecasting techniques to forecast item demand based on usage statistics	○	○	○	○	○	○
Network Optimization – planning routes through the supply network that minimize lead time and cost	○	○	○	○	○	○
Requirements Planning (Deployment) – identifying CCDR requirements; understanding and using various planning systems, e.g. JOPES, DCAPES	○	○	○	○	○	○
Distribution Requirements Planning – allocating distribution resources based on priority and strategic mission objectives	○	○	○	○	○	○
Adaptive Planning – contingency planning based on unforeseen circumstances	○	○	○	○	○	○
Sustainment Planning – identifying warfighter requirements for the duration of a contingency	○	○	○	○	○	○

8. Please indicate how proficient you need to be in the Joint competency to perform your primary duties. Joint includes areas such as: Joint Theater Logistics; Host Nation Support; Coalition Operations; Joint Deployment & Distribution Architecture; End to End Analysis; Joint Capabilities Development, Budgeting & Acquisition Proficiency; Multinational Relationship Management; Service to Service Interoperability.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Joint Theater Logistics – integration and execution of logistics operations across multiple theaters	○	○	○	○	○	○
Host Nation Support – determining the best use of host nation capabilities based on availability and cost	○	○	○	○	○	○
Coalition Operations – actual involvement with armed forces of other nations	○	○	○	○	○	○
Joint Deployment & Distribution Architecture – distribution network oversight and management across multiple service domains	○	○	○	○	○	○
End to End Analysis – calculating materiel requirements and distribution strategies for multiple services	○	○	○	○	○	○
Joint Capabilities Development, Budgeting & Acquisition Proficiency – execution of capabilities for multiple services with consideration of budgeting and acquisition requirements across two or more services	○	○	○	○	○	○
Multinational Relationship Management – building and fostering positive relationships with other nations	○	○	○	○	○	○
Service to Service Interoperability – actual involvement with other service components and understanding of the need for a common logistics language	○	○	○	○	○	○

9. Please indicate how proficient you need to be in the Maintenance competency to perform your primary duties. Maintenance includes areas such as: Depot Maintenance Operations; Field Maintenance Operations.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Depot Maintenance Operations – repair, modification, overhaul of entire weapons systems and components to maximize life cycle systems readiness	○	○	○	○	○	○
Field Maintenance Operations – rapidly returning weapons systems and components to users in a ready status	○	○	○	○	○	○

10. Please indicate how proficient you need to be in the Deployment competency to perform your primary duties. Deployment includes areas such as: Movement Requirements Forecasting; Material Readiness; Contracting; Deployment Strategy; In-Transit Visibility/Asset Visibility.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Movement Requirements Forecasting – applying quantitative forecasting techniques to determine movement of personnel and equipment	○	○	○	○	○	○
Material Readiness – maintaining stock levels; ensuring item availability	○	○	○	○	○	○
Contracting – determining what services to contract in a deployed location based on organic availability and cost; maintaining visibility over contractor operations	○	○	○	○	○	○
Deployment Strategy – determining how best to deploy and distribute assets based on limited resources and CCDR requirements	○	○	○	○	○	○
In-Transit Visibility/Asset Visibility – understanding the purpose of ITV; understanding how and why to use GTN, CMOS, GATES, etc.	○	○	○	○	○	○

11. Please indicate how proficient you need to be in the Distribution competency to perform your primary duties. Distribution includes areas such as: Transportation Mode Selection; Distribution Portfolio Management.

	Basic	Intermediate	Proficient	Skilled	Advanced	N/A
Transportation Mode Selection – determining the transportation medium that best suits the demand of the end item user, e.g. airplane, rail, truck, ship	○	○	○	○	○	○
Distribution Portfolio Management – management of resource allocation to various distribution suppliers	○	○	○	○	○	○

12. Within the Life Cycle Logistics competency please indicate whether you require a certification to perform your primary duties. Certifications are: Acquisition Logistics Certification; Program Management Certification.

	Yes	No
Acquisition Logistics Certification	○	○
Program Management Certification	○	○

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AFIT Study: LRO Survey (Survey Control Number AF13-209AFIT)

Logistics Courses

This section will be used to gather information about the logistics-related courses that you HAVE taken and found useful to you in your current job. Please do not consider professional military education (PME) courses such as SOS, ACSC, etc.

*NOTE: Please choose the "Other" option before typing in the text box.

13. What AFIT School of Systems and Logistics course(s) have you taken that have increased your ability to perform your primary duties?

- ☐ Log 040 Intro to Supply Chain Management
- ☐ Log 041 Intro to Continuous Process Improvement
- ☐ Log 042 Enterprise Resource Planning Basics
- ☐ Log 043 Forecasting Basics
- ☐ Log 044 Collaborative Inventory Planning
- ☐ Log 045 Strategic Sourcing Basics
- ☐ Log 047 Asset Marking & Tracking
- ☐ Log 049 Logistics Enterprise Architecture & the SCOR Model
- ☐ Log 050 AF Transformation: AFSO21 & eLog21
- ☐ Log 099 Fundamentals of Logistics
- ☐ Log 103 Central Asset Management
- ☐ Log 117 Process Improvement Team Member Course
- ☐ Log 131 Industrial Maintenance Management
- ☐ Log 132 Production Maintenance Management
- ☐ Log 135 Systems Lifecycle Integrity Management
- ☐ Log 140 LRO Contingency Operations Course
- ☐ Log 141 LRO Distribution Course
- ☐ Log 142 LRO Materiel Management Course
- ☐ Log 143 LRS Quality Assurance Evaluator Course
- ☐ Log 199 Introduction to Logistics (AF)
- ☐ Log 238 Critical Chain Project Management Foundational Concepts
- ☐ Log 262 Applied Maintenance Management Concepts
- ☐ Log 299 Combat Logistics
- ☐ Log 399 Strategic Logistics Management
- ☐ Log 499 Air Force Logistics Executive Development Seminar
- ☐ None
- ☐ Other

Other (please specify)

14. Which of the following logistics-related course(s) have you taken that have increased your ability to perform your primary duties?

- ☐ APOC - Aerial Port Operations Course
- ☐ ALROC - Advanced Logistics Readiness Officer Course
- ☐ CWPC – Contingency Wartime Planning Course
- ☐ DCAPES Basic Course
- ☐ DCAPES Advanced Course
- ☐ ESSP - Expeditionary Site Survey Planning Course
- ☐ IDOC - Installation Deployment Officer Course
- ☐ IROC – Intermediate LRO Course
- ☐ JAOPC – Joint Air Operations Planning Course
- ☐ JOPES – Joint Operation Planning & Execution System Course
- ☐ LOGMOD IDS - Logistics Module & the Integrated Deployment System
- ☐ MAPOC - Management of Aerial Port Operations Course
- ☐ UDM – Unit Deployment Manager Course
- ☐ None
- ☐ Other

Other (please specify)

15. What Defense Acquisition University (DAU) Logistics Course(s) have you taken that have increased your ability to perform your primary duties?

- ☐ CLL001 – Life Cycle Management & Sustainment Metrics
- ☐ CLL002 – Defense Logistics Agency Support to the Project Manager
- ☐ CLL003 – Supportability Test & Evaluation
- ☐ CLL004 – Life Cycle Logistics for the Rest of Us
- ☐ CLL005 – Developing a Life Cycle Sustainment Plan (LCSP)
- ☐ CLL006 – Depot Maintenance Partnering
- ☐ CLL007 – Lead-free Electronics Impact on DoD Programs
- ☐ CLL008 – Designing for Supportability in DoD Systems
- ☐ CLL011 – Performance Based Logistics (PBL) Product Support
- ☐ CLL012 – Supportability Analysis
- ☐ CLL013 – DoD Packaging
- ☐ CLL014 – Joint Systems Integrated Support Strategies (JSISS)
- ☐ CLL015 – Product Support Business Case Analysis (BCA)
- ☐ CLL016 – Joint Logistics
- ☐ CLL017 – Introduction to Defense Distribution
- ☐ CLL018 – Joint Deployment Distribution Operations Center (JDDOC)
- ☐ CLL019 – Technology Refreshment Planning
- ☐ CLL020 – Independent Logistics Assessments
- ☐ CLL022 – Title 10 Depot Maintenance Statute Overview
- ☐ CLL023 – Title 10 USC 2464 Core Statute Implementation
- ☐ CLL024 – Title 10 Limitations on the Performance of Depot Level Mx
- ☐ CLL025 – Depot Maintenance Interservice Support Agreements
- ☐ CLL026 – Depot Maintenance Capacity Measurement
- ☐ CLL029 – Condition Based Maintenance Plus
- ☐ CLL030 – Reliability Centered Maintenance
- ☐ CLL032 – Preventing Counterfeit Parts from Entering DoD Supply System
- ☐ CLL033 – Logistician's Responsibilities During Major Technical Reviews
- ☐ CLL036 – Product Support Manager (PSM)
- ☐ CLL043 – Green Logistics: Planning for Sustainability
- ☐ CLL054 – Joint Task Force Port Opening (JTF-PO)
- ☐ CLL055 – Joint Deployment & Distribution Performance Metrics Framework
- ☐ CLL057 – Level of Repair Analysis: Introduction
- ☐ CLL058 – Level of Repair Analysis: Theory & Principles
- ☐ CLL1119 – Technical Refreshment Implementation Module
- ☐ CLL120 – Introduction to the DoD Shelf Life Program
- ☐ CLL201 – Diminishing Manufacturing Sources & Material Shortages (DMSMS) Fundamentals
- ☐ CLL202 – DMSMS Executive Overview
- ☐ CLL203 – DMSMS Essentials
- ☐ CLL204 – DMSMS Case Studies
- ☐ CLL205 – DMSMS for Technical Professionals
- ☐ CLL206 – Parts Management Executive Overview
- ☐ LOG101 – Acquisition Logistics Fundamentals
- ☐ LOG102 – Systems Sustainment Management Fundamentals
- ☐ LOG103 – Reliability, Availability & Maintainability (RAM)
- ☐ LOG200 – Intermediate Acquisition Management Part A
- ☐ LOG201 – Intermediate Acquisition Management Part B
- ☐ LOG204 – Configuration Management
- ☐ LOG206 – Intermediate Systems Sustainment Management
- ☐ LOG235 – Performance Based Logistics
- ☐ LOG340 – Life Cycle Product Support
- ☐ LOG350 – Executive Life Cycle Logistics Management
- ☐ None
- ☐ Other

Other (please specify)

67%

Prev Next

AFIT Study: LRO Survey (Survey Control Number AF13-209AFIT)

Logistics Courses

This section will be used to gather information about the logistics-related courses that you have NOT taken but would be useful to you in your current job. Please do not consider professional military education (PME) courses such as SOS, ACSC, etc.

*NOTE: Please choose the "Other" option before typing in the text box.

16. What AFIT School of Systems and Logistics course(s) have you NOT taken but feel would increase your ability to perform your primary duties?

- ☐ Log 040 Intro to Supply Chain Management
- ☐ Log 041 Intro to Continuous Process Improvement
- ☐ Log 042 Enterprise Resource Planning Basics
- ☐ Log 043 Forecasting Basics
- ☐ Log 044 Collaborative Inventory Planning
- ☐ Log 045 Strategic Sourcing Basics
- ☐ Log 047 Asset Marking & Tracking
- ☐ Log 049 Logistics Enterprise Architecture & the SCOR Model
- ☐ Log 050 AF Transformation: AFSO21 & eLog21
- ☐ Log 099 Fundamentals of Logistics
- ☐ Log 103 Central Asset Management
- ☐ Log 117 Process Improvement Team Member Course
- ☐ Log 131 Industrial Maintenance Management
- ☐ Log 132 Production Maintenance Management
- ☐ Log 135 Systems Lifecycle Integrity Management
- ☐ Log 140 LRO Contingency Operations Course
- ☐ Log 141 LRO Distribution Course
- ☐ Log 142 LRO Materiel Management Course
- ☐ Log 143 LRS Quality Assurance Evaluator Course
- ☐ Log 199 Introduction to Logistics (AF)
- ☐ Log 238 Critical Chain Project Management Foundational Concepts
- ☐ Log 262 Applied Maintenance Management Concepts
- ☐ Log 299 Combat Logistics
- ☐ Log 399 Strategic Logistics Management
- ☐ Log 499 Air Force Logistics Executive Development Seminar
- ☐ None
- ☐ Other

Other (please specify)

17. Which of the following logistics-related course(s) have you NOT taken but feel would increase your ability to perform your primary duties?

- ☐ APOC - Aerial Port Operations Course
- ☐ ALROC - Advanced Logistics Readiness Officer Course
- ☐ CWPC – Contingency Wartime Planning Course
- ☐ DCAPES Basic Course
- ☐ DCAPES Advanced Course
- ☐ ESSP - Expeditionary Site Survey Planning Course
- ☐ IDOC - Installation Deployment Officer Course
- ☐ IROC – Intermediate LRO Course
- ☐ JAOPC – Joint Air Operations Planning Course
- ☐ JOPES – Joint Operation Planning & Execution System Course
- ☐ LOGMOD IDS - Logistics Module & the Integrated Deployment System
- ☐ MAPOC - Management of Aerial Port Operations Course
- ☐ UDM – Unit Deployment Manager Course
- ☐ None
- ☐ Other

Other (please specify)

18. Which Defense Acquisition University (DAU) Logistics Course(s) have you NOT taken but feel would increase your ability to perform your primary duties?

- ☐ CLL001 – Life Cycle Management & Sustainment Metrics
- ☐ CLL002 – Defense Logistics Agency Support to the Project Manager
- ☐ CLL003 – Supportability Test & Evaluation
- ☐ CLL004 – Life Cycle Logistics for the Rest of Us
- ☐ CLL005 – Developing a Life Cycle Sustainment Plan (LCSP)
- ☐ CLL006 – Depot Maintenance Partnering
- ☐ CLL007 – Lead-free Electronics Impact on DoD Programs
- ☐ CLL008 – Designing for Supportability in DoD Systems
- ☐ CLL011 – Performance Based Logistics (PBL) Product Support
- ☐ CLL012 – Supportability Analysis
- ☐ CLL013 – DoD Packaging
- ☐ CLL014 – Joint Systems Integrated Support Strategies (JSISS)
- ☐ CLL015 – Product Support Business Case Analysis (BCA)
- ☐ CLL016 – Joint Logistics
- ☐ CLL017 – Introduction to Defense Distribution
- ☐ CLL018 – Joint Deployment Distribution Operations Center (JDDOC)
- ☐ CLL019 – Technology Refreshment Planning
- ☐ CLL020 – Independent Logistics Assessments
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- ☐ CLL024 – Title 10 Limitations on the Performance of Depot Level Mx
- ☐ CLL025 – Depot Maintenance Interservice Support Agreements
- ☐ CLL026 – Depot Maintenance Capacity Measurement
- ☐ CLL029 – Condition Based Maintenance Plus
- ☐ CLL030 – Reliability Centered Maintenance
- ☐ CLL032 – Preventing Counterfeit Parts from Entering DoD Supply System
- ☐ CLL033 – Logistician's Responsibilities During Major Technical Reviews
- ☐ CLL036 – Product Support Manager (PSM)
- ☐ CLL043 – Green Logistics: Planning for Sustainability
- ☐ CLL054 – Joint Task Force Port Opening (JTF-PO)
- ☐ CLL055 – Joint Deployment & Distribution Performance Metrics Framework
- ☐ CLL057 – Level of Repair Analysis: Introduction
- ☐ CLL058 – Level of Repair Analysis: Theory & Principles
- ☐ CLL1119 – Technical Refreshment Implementation Module
- ☐ CLL120 – Introduction to the DoD Shelf Life Program
- ☐ CLL201 – Diminishing Manufacturing Sources & Material Shortages (DMSMS) Fundamentals
- ☐ CLL202 – DMSMS Executive Overview
- ☐ CLL203 – DMSMS Essentials
- ☐ CLL204 – DMSMS Case Studies
- ☐ CLL205 – DMSMS for Technical Professionals
- ☐ CLL206 – Parts Management Executive Overview
- ☐ LOG101 – Acquisition Logistics Fundamentals
- ☐ LOG102 – Systems Sustainment Management Fundamentals
- ☐ LOG103 – Reliability, Availability & Maintainability (RAM)
- ☐ LOG200 – Intermediate Acquisition Management Part A
- ☐ LOG201 – Intermediate Acquisition Management Part B
- ☐ LOG204 – Configuration Management
- ☐ LOG206 – Intermediate Systems Sustainment Management
- ☐ LOG235 – Performance Based Logistics
- ☐ LOG340 – Life Cycle Product Support
- ☐ LOG350 – Executive Life Cycle Logistics Management
- ☐ None
- ☐ Other

Other (please specify)

83%

Prev Next

AFIT Study: LRO Survey (Survey Control Number AF13-209AFIT)

Demographics Information

This section will be used to gather information about your career and current job.

*NOTE: Please choose the "Other" option before typing in the text box.

19. What is your current rank?

20. What best describes your area of responsibility?

Other (please specify)

21. What best describes your current duty title?

Other (please specify)

22. Which best describes the level at which you perform your primary duties?

Other (please specify)

23. Which most closely describes your current MAJCOM (or equivalent)?

Other (please specify)

24. Please indicate how long you have served in the USAF as an LRO.

	Years	Months
Time in Service as an LRO		

25. Please indicate how long you have served in your current position (excluding deployments outside of your primary duties).

	Years	Months
Time in current position		

26. Which best describes your primary duties?

- Tactical
- Operational
- Strategic
- Not Sure

27. Please indicate your highest level of education completed.

- Bachelors Degree
- Masters Degree
- PhD

28. Which most closely describes your undergraduate degree emphasis?

- Business-related (e.g. Accounting, Finance, Management)
- Science-related (e.g. Biology, Chemistry, Psychology, Physics)
- Other (please use comment box)

Other (please specify)

29. Which most closely describes your graduate degree emphasis?

- Business-related (e.g. MBA)
- Logistics- or Supply Chain-related (e.g. Logistics & Supply Chain Management)
- Science-related (e.g. Biology, Chemistry, Psychology, Physics)
- N/A
- Other (please use comment box)

Other (please specify)

30. If you have a PhD, please indicate in what area.

31. Are you prior enlisted?

- Yes
- No

100%

Prev Done

Appendix D. DLOQ Construct Definitions (Marsick and Watkins, 2003)

TABLE 1: Definitions of Constructs for the Dimensions of the Learning Organization Questionnaire

Dimension	Definition
Create continuous learning opportunities	Learning is designed into work so that people can learn on the job; opportunities are provided for ongoing education and growth.
Promote inquiry and dialogue	People gain productive reasoning skills to express their views and the capacity to listen and inquire into the views of others; the culture is changed to support questioning, feedback, and experimentation.
Encourage collaboration and team learning	Work is designed to use groups to access different modes of thinking; groups are expected to learn together and work together; collaboration is valued by the culture and rewarded.
Create systems to capture and share learning	Both high- and low-technology systems to share learning are created and integrated with work; access is provided; systems are maintained.
Empower people toward a collective vision	People are involved in setting, owning, and implementing a joint vision; responsibility is distributed close to decision making so that people are motivated to learn toward what they are held accountable to do.
Connect the organization to its environment	People are helped to see the effect of their work on the entire enterprise; people scan the environment and use information to adjust work practices; the organization is linked to its communities.
Provide strategic leadership for learning	Leaders model, champion, and support learning; leadership uses learning strategically for business results.
Key results	
Financial performance	State of financial health and resources available for growth
Knowledge performance	Enhancement of products and services because of learning and knowledge capacity (lead indicators of intellectual capital)

Appendix E. Participation Request Email

Fellow Loggie,

You have been selected to participate in a survey to better aid our development of the Deliberate Continuum of Learning (DCoL) for LROs. The
DCoL will shape the future of education and training initiatives so your participation is greatly appreciated. Please take approximately 20 minutes to complete the survey at the link below. If you have any questions please direct them to Lt Col Joseph Skipper at joseph.skipper@afit.edu. Thank you.

https://www.surveymonkey.com/s/LRO_Survey

V/R
ptk
PATRICK T. KUMASHIRO, Col, USAF
Chief, Force Development & Organizations Division, AF/A4LF
1030 Air Force Pentagon/4C1088
Washington, DC 20330

Appendix F. Competencies, Sub-Competencies and Examples

Competencies	Sub-competencies	Examples
Supply	Supplier Relationship Management	interaction with DLA or other sister service level vendor; evaluating suppliers based on performance indicators, e.g. on-time delivery rates, number of rejects, cycle time
	Sourcing & Procurement Strategy	deciding which suppliers to use to meet mission requirements while minimizing total cost; deciding on push or pull systems
	Inventory Planning	planning inventory requirements based on usage or consumption statistics
	Inventory Management	warehouse management activities to include issue/receipt, storage, inspection, etc.
	Material Disposition	disposing of assets to DRMS or deciding how best to dispose of material that has reached the end of its life cycle
	Return/Retrograde	reverse logistics; capture and disposition of downstream products from customers; retrograge of equipment from the AOR back to the US or other strategy
Transportation	Distribution Network Analysis	route optimization techniques to minimize total pipeline time
	Inbound/Outbound Transportation Management	receiving, shipping, proper inspection and documentation of inbound/outbound cargo
	Transportation Planning	selecting routes and transportation mediums, e.g. rail, truck, airplane, ship
	Transportation Marketplace Knowledge	understanding of what transportation mediums are available, cost of transportation mediums
Planning	Demand Forecasting	employing quantitative forecasting techniques to forecast item demand based on usage statistics
	Network Optimization	planning routes through the supply network that minimize lead time and cost
	Requirements Planning (Deployment)	identifying CCDR requirements; understanding and using various planning systems, e.g. JOPES, DCAPES
	Distribution Requirements Planning	allocating distribution resources based on priority and strategic mission objectives
	Adaptive Planning	contingency planning based on unforeseen circumstances
	Sustainment Planning	identifying warfighter requirements for the duration of a contingency

Notes: Table continued on next page

Competencies	Sub-competencies	Examples
Joint	Joint Theater Logistics	integration and execution of logistics operations across multiple theaters
	Host Nation Support	determining the best use of host nation capabilities based on availability and cost
	Coalition Operations	actual involvement with armed forces of other nations
	Joint Deployment & Distribution Architecture	distribution network oversight and management across multiple service domains
	End to End Analysis	calculating materiel requirements and distribution strategies for multiple services
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	execution of capabilities for multiple services with consideration of budgeting and acquisition requirements across two or more services
	Multinational Relationship Management	building and fostering positive relationships with other nations
	Service to Service Interoperability	actual involvement with other service components and understanding of the need for a common logistics language
Maintenance	Depot Maintenance Operations	repair, modification, overhaul of entire weapons systems and components to maximize life cycle systems readiness
	Field Maintenance Operations	rapidly returning weapons systems and components to users in a ready status
Deployment	Movement Requirements Forecasting	applying quantitative forecasting techniques to determine movement of personnel and equipment
	Material Readiness	maintaining stock levels; ensuring item availability
	Contracting	determining what services to contract in a deployed location based on organic availability and cost; maintaining visibility over contractor operations
	Deployment Strategy	determining how best to deploy and distribute assets based on limited resources and CCDR requirements
	In-Transit Visibility/Asset Visibility	understanding the purpose of ITV; understanding how and why to use GTN, CMOS, GATES, etc.
Distribution	Transportation Mode Selection	determining the transportation medium that best suits the demand of the end item user, e.g. airplane, rail, truck, ship
	Distribution Portfolio Management	management of resource allocation to various distribution suppliers
Life Cycle Logistics	Acquisition Logistics Certification	
	Program Management Certification	

Source: Department of the Air Force, 2013

Appendix G. Required Proficiency Levels

Competency	Sub-competency	N/A	B	I	P	S	A
Supply	Supplier Relationship Management	91	86	66	105	97	65
	Sourcing & Procurement Strategy	102	103	52	112	78	63
	Inventory Planning	80	104	61	132	93	59
	Inventory Management	80	105	66	138	91	57
	Material Disposition	79	106	82	133	82	35
	Return/Retrograde	79	107	59	129	114	66
Transportation	Distribution Network Analysis	78	108	74	104	100	79
	Inbound/Outbound Transportation Management	79	109	80	105	101	73
	Transportation Planning	80	110	64	106	112	73
	Transportation Marketplace Knowledge	81	111	76	107	115	71
Planning	Demand Forecasting	82	112	73	108	102	70
	Network Optimization	83	113	74	109	112	65
	Requirements Planning (Deployment)	84	114	51	110	123	116
	Distribution Requirements Planning	85	115	53	111	118	88
	Adaptive Planning	86	116	40	112	144	134
	Sustainment Planning	87	117	44	113	137	116

n = 510; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Table continues on next page

Competency	Sub-competency	N/A	B	I	P	S	A
Joint	Joint Theater Logistics	88	118	55	114	114	117
	Host Nation Support	89	119	48	115	117	84
	Coalition Operations	90	120	55	116	123	87
	Joint Deployment & Distribution Architecture	91	121	56	117	118	109
	End to End Analysis	92	122	59	118	96	72
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	93	123	61	119	85	80
	Multinational Relationship Management	94	124	51	120	98	103
	Service to Service Interoperability	95	125	53	121	117	114
Maintenance	Depot Maintenance Operations	96	126	74	122	59	33
	Field Maintenance Operations	97	127	73	123	69	30
Deployment	Movement Requirements Forecasting	98	128	58	124	123	77
	Material Readiness	99	129	81	125	107	56
	Contracting	100	130	85	126	89	45
	Deployment Strategy	101	131	52	127	127	109
	In-Transit Visibility/Asset Visibility	102	132	63	128	132	90
Distribution	Transportation Mode Selection	103	133	80	129	106	59
	Distribution Portfolio Management	104	134	72	130	97	35
Life Cycle Logistics	Acquisition Logistics Certification	105	135				
	Program Management Certification	106	136				

n = 510; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced

		2d Lt					
Competency	**Sub-competency**	**N/A**	**B**	**I**	**P**	**S**	**A**
Supply	Supplier Relationship Management	30.0%	20.0%	10.0%	16.7%	13.3%	10.0%
	Sourcing & Procurement Strategy	30.0%	23.3%	10.0%	16.7%	10.0%	10.0%
	Inventory Planning	30.0%	23.3%	10.0%	20.0%	13.3%	3.3%
	Inventory Management	23.3%	20.0%	20.0%	30.0%	3.3%	3.3%
	Material Disposition	26.7%	20.0%	16.7%	20.0%	16.7%	0.0%
	Return/Retrograde	30.0%	13.3%	16.7%	10.0%	23.3%	6.7%
Transportation	Distribution Network Analysis	26.7%	10.0%	13.3%	20.0%	16.7%	13.3%
	Inbound/Outbound Transportation Management	16.7%	13.3%	6.7%	20.0%	30.0%	13.3%
	Transportation Planning	20.0%	23.3%	3.3%	20.0%	23.3%	10.0%
	Transportation Marketplace Knowledge	23.3%	13.3%	10.0%	20.0%	13.3%	20.0%
Planning	Demand Forecasting	30.0%	13.3%	13.3%	13.3%	30.0%	0.0%
	Network Optimization	36.7%	10.0%	10.0%	13.3%	23.3%	6.7%
	Requirements Planning (Deployment)	36.7%	10.0%	6.7%	10.0%	10.0%	26.7%
	Distribution Requirements Planning	33.3%	10.0%	3.3%	16.7%	23.3%	13.3%
	Adaptive Planning	33.3%	10.0%	10.0%	10.0%	26.7%	10.0%
	Sustainment Planning	33.3%	13.3%	10.0%	10.0%	20.0%	13.3%
Joint	Joint Theater Logistics	20.0%	16.7%	16.7%	10.0%	20.0%	16.7%
	Host Nation Support	26.7%	16.7%	10.0%	20.0%	16.7%	10.0%
	Coalition Operations	23.3%	20.0%	10.0%	20.0%	23.3%	3.3%
	Joint Deployment & Distribution Architecture	26.7%	13.3%	13.3%	16.7%	20.0%	10.0%
	End to End Analysis	26.7%	20.0%	6.7%	16.7%	20.0%	10.0%
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	26.7%	16.7%	10.0%	13.3%	10.0%	23.3%
	Multinational Relationship Management	26.7%	10.0%	10.0%	26.7%	16.7%	10.0%
	Service to Service Interoperability	26.7%	13.3%	3.3%	20.0%	23.3%	13.3%
Maintenance	Depot Maintenance Operations	40.0%	16.7%	10.0%	16.7%	10.0%	6.7%
	Field Maintenance Operations	43.3%	13.3%	10.0%	13.3%	16.7%	3.3%
Deployment	Movement Requirements Forecasting	20.0%	20.0%	13.3%	20.0%	16.7%	10.0%
	Material Readiness	16.7%	20.0%	16.7%	23.3%	16.7%	6.7%
	Contracting	26.7%	13.3%	16.7%	20.0%	20.0%	3.3%
	Deployment Strategy	26.7%	13.3%	10.0%	20.0%	16.7%	13.3%
	In-Transit Visibility/Asset Visibility	13.3%	6.7%	13.3%	26.7%	26.7%	13.3%
Distribution	Transportation Mode Selection	20.0%	16.7%	13.3%	26.7%	20.0%	3.3%
	Distribution Portfolio Management	26.7%	10.0%	13.3%	33.3%	13.3%	3.3%
Life Cycle Logistics	Acquisition Logistics Certification	20.0%					
	Program Management Certification	13.3%					

Notes: n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n =111 for Lt Col, n = 35 for Col; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Values for Life Cycle Logistics are "Yes" answers

		1st Lt					
Competency	**Sub-competency**	**N/A**	**B**	**I**	**P**	**S**	**A**
Supply	Supplier Relationship Management	23.5%	17.6%	13.2%	19.1%	16.2%	10.3%
	Sourcing & Procurement Strategy	22.1%	19.1%	8.8%	14.7%	14.7%	20.6%
	Inventory Planning	16.2%	19.1%	13.2%	22.1%	14.7%	14.7%
	Inventory Management	16.2%	17.6%	11.8%	26.5%	14.7%	13.2%
	Material Disposition	16.2%	22.1%	14.7%	20.6%	17.6%	8.8%
	Return/Retrograde	17.6%	16.2%	13.2%	20.6%	22.1%	10.3%
Transportation	Distribution Network Analysis	8.8%	13.2%	20.6%	20.6%	23.5%	13.2%
	Inbound/Outbound Transportation Management	7.4%	11.8%	11.8%	36.8%	13.2%	19.1%
	Transportation Planning	8.8%	13.2%	14.7%	30.9%	20.6%	11.8%
	Transportation Marketplace Knowledge	7.4%	14.7%	17.6%	25.0%	20.6%	14.7%
Planning	Demand Forecasting	8.8%	14.7%	19.1%	20.6%	19.1%	17.6%
	Network Optimization	13.2%	19.1%	14.7%	11.8%	25.0%	16.2%
	Requirements Planning (Deployment)	7.4%	16.2%	10.3%	17.6%	22.1%	26.5%
	Distribution Requirements Planning	7.4%	14.7%	17.6%	20.6%	22.1%	17.6%
	Adaptive Planning	4.4%	11.8%	13.2%	22.1%	22.1%	26.5%
	Sustainment Planning	7.4%	13.2%	14.7%	17.6%	20.6%	26.5%
Joint	Joint Theater Logistics	22.1%	14.7%	14.7%	13.2%	11.8%	23.5%
	Host Nation Support	25.0%	13.2%	7.4%	17.6%	22.1%	14.7%
	Coalition Operations	23.5%	14.7%	10.3%	14.7%	22.1%	14.7%
	Joint Deployment & Distribution Architecture	20.6%	19.1%	11.8%	11.8%	20.6%	16.2%
	End to End Analysis	30.9%	14.7%	7.4%	20.6%	13.2%	13.2%
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	29.4%	17.6%	7.4%	16.2%	14.7%	14.7%
	Multinational Relationship Management	23.5%	16.2%	7.4%	19.1%	11.8%	22.1%
	Service to Service Interoperability	22.1%	14.7%	8.8%	20.6%	14.7%	19.1%
Maintenance	Depot Maintenance Operations	32.4%	16.2%	10.3%	13.2%	17.6%	10.3%
	Field Maintenance Operations	27.9%	14.7%	14.7%	14.7%	16.2%	11.8%
Deployment	Movement Requirements Forecasting	13.2%	7.4%	13.2%	22.1%	22.1%	22.1%
	Material Readiness	10.3%	14.7%	19.1%	20.6%	19.1%	16.2%
	Contracting	22.1%	16.2%	10.3%	17.6%	22.1%	11.8%
	Deployment Strategy	14.7%	8.8%	10.3%	20.6%	20.6%	25.0%
	In-Transit Visibility/Asset Visibility	8.8%	5.9%	11.8%	29.4%	23.5%	20.6%
Distribution	Transportation Mode Selection	8.8%	11.8%	19.1%	20.6%	30.9%	8.8%
	Distribution Portfolio Management	13.2%	19.1%	16.2%	17.6%	25.0%	8.8%
Life Cycle Logistics	Acquisition Logistics Certification	20.6%					
	Program Management Certification	16.2%					

Notes: n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n =111 for Lt Col, n = 35 for Col; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Values for Life Cycle Logistics are "Yes" answers

		Capt					
Competency	**Sub-competency**	**N/A**	**B**	**I**	**P**	**S**	**A**
Supply	Supplier Relationship Management	16.7%	21.2%	14.7%	21.8%	19.2%	6.4%
	Sourcing & Procurement Strategy	17.3%	22.4%	14.1%	21.8%	16.0%	8.3%
	Inventory Planning	14.7%	17.3%	12.8%	28.2%	19.2%	7.7%
	Inventory Management	15.4%	14.1%	14.7%	29.5%	18.6%	7.7%
	Material Disposition	14.1%	17.9%	18.6%	29.5%	16.0%	3.8%
	Return/Retrograde	14.1%	14.7%	9.6%	30.1%	22.4%	9.0%
Transportation	Distribution Network Analysis	19.9%	21.8%	14.7%	21.2%	13.5%	9.0%
	Inbound/Outbound Transportation Management	12.8%	12.2%	21.8%	28.8%	16.7%	7.7%
	Transportation Planning	16.0%	19.9%	12.8%	20.5%	18.6%	12.2%
	Transportation Marketplace Knowledge	14.7%	14.7%	16.0%	21.2%	25.6%	7.7%
Planning	Demand Forecasting	19.9%	16.0%	14.7%	20.5%	16.7%	12.2%
	Network Optimization	21.8%	16.7%	14.1%	16.0%	22.4%	9.0%
	Requirements Planning (Deployment)	16.0%	9.6%	12.2%	20.5%	25.0%	16.7%
	Distribution Requirements Planning	17.9%	10.9%	9.6%	23.7%	25.6%	12.2%
	Adaptive Planning	12.8%	8.3%	7.1%	18.6%	32.7%	20.5%
	Sustainment Planning	15.4%	7.1%	7.1%	21.8%	30.1%	18.6%
Joint	Joint Theater Logistics	16.7%	9.0%	12.8%	18.6%	25.0%	17.9%
	Host Nation Support	20.5%	8.3%	12.2%	17.9%	27.6%	13.5%
	Coalition Operations	19.9%	12.8%	10.9%	17.9%	21.2%	17.3%
	Joint Deployment & Distribution Architecture	17.9%	16.0%	10.3%	16.7%	22.4%	16.7%
	End to End Analysis	21.8%	17.9%	14.1%	17.3%	19.9%	9.0%
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	21.8%	17.9%	13.5%	17.3%	17.3%	12.2%
	Multinational Relationship Management	19.9%	12.2%	10.9%	17.3%	19.2%	20.5%
	Service to Service Interoperability	13.5%	12.2%	10.3%	20.5%	25.6%	17.9%
Maintenance	Depot Maintenance Operations	26.9%	23.1%	13.5%	19.2%	12.8%	4.5%
	Field Maintenance Operations	26.9%	20.5%	14.7%	19.9%	12.2%	5.8%
Deployment	Movement Requirements Forecasting	14.7%	12.8%	14.1%	19.9%	26.3%	12.2%
	Material Readiness	12.8%	13.5%	14.1%	32.1%	20.5%	7.1%
	Contracting	19.2%	16.7%	14.1%	25.0%	16.7%	8.3%
	Deployment Strategy	14.1%	12.2%	12.8%	19.9%	25.6%	15.4%
	In-Transit Visibility/Asset Visibility	12.2%	12.2%	12.2%	24.4%	21.2%	17.9%
Distribution	Transportation Mode Selection	12.2%	18.6%	14.1%	27.6%	16.7%	10.9%
	Distribution Portfolio Management	19.2%	19.9%	12.2%	28.2%	14.7%	5.8%
Life Cycle Logistics	Acquisition Logistics Certification	15.4%					
	Program Management Certification	12.8%					

Notes: n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n =111 for Lt Col, n = 35 for Col; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Values for Life Cycle Logistics are "Yes" answers

		Maj					
Competency	**Sub-competency**	**N/A**	**B**	**I**	**P**	**S**	**A**
Supply	Supplier Relationship Management	14.5%	15.5%	15.5%	16.4%	22.7%	15.5%
	Sourcing & Procurement Strategy	20.9%	17.3%	9.1%	24.5%	13.6%	14.5%
	Inventory Planning	11.8%	15.5%	12.7%	23.6%	23.6%	12.7%
	Inventory Management	11.8%	15.5%	16.4%	23.6%	20.0%	12.7%
	Material Disposition	12.7%	19.1%	18.2%	27.3%	14.5%	8.2%
	Return/Retrograde	11.8%	10.9%	13.6%	30.0%	17.3%	16.4%
Transportation	Distribution Network Analysis	10.9%	12.7%	13.6%	20.9%	21.8%	20.0%
	Inbound/Outbound Transportation Management	7.3%	10.0%	15.5%	27.3%	19.1%	20.9%
	Transportation Planning	12.7%	12.7%	13.6%	20.9%	23.6%	16.4%
	Transportation Marketplace Knowledge	10.0%	11.8%	13.6%	26.4%	18.2%	20.0%
Planning	Demand Forecasting	10.9%	13.6%	11.8%	30.0%	17.3%	16.4%
	Network Optimization	18.2%	11.8%	14.5%	23.6%	16.4%	15.5%
	Requirements Planning (Deployment)	10.9%	9.1%	10.0%	20.9%	26.4%	22.7%
	Distribution Requirements Planning	9.1%	11.8%	6.4%	30.9%	21.8%	20.0%
	Adaptive Planning	7.3%	6.4%	7.3%	22.7%	29.1%	27.3%
	Sustainment Planning	11.8%	3.6%	9.1%	24.5%	30.0%	20.9%
Joint	Joint Theater Logistics	10.9%	9.1%	10.0%	23.6%	22.7%	23.6%
	Host Nation Support	15.5%	12.7%	8.2%	27.3%	17.3%	19.1%
	Coalition Operations	14.5%	11.8%	10.0%	20.9%	20.9%	21.8%
	Joint Deployment & Distribution Architecture	10.9%	10.9%	14.5%	15.5%	21.8%	26.4%
	End to End Analysis	14.5%	13.6%	11.8%	22.7%	18.2%	19.1%
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	14.5%	16.4%	15.5%	20.0%	14.5%	19.1%
	Multinational Relationship Management	13.6%	11.8%	12.7%	20.0%	20.0%	21.8%
	Service to Service Interoperability	9.1%	7.3%	14.5%	20.9%	26.4%	21.8%
Maintenance	Depot Maintenance Operations	20.0%	22.7%	18.2%	23.6%	10.0%	5.5%
	Field Maintenance Operations	20.0%	16.4%	17.3%	26.4%	14.5%	5.5%
Deployment	Movement Requirements Forecasting	12.7%	9.1%	9.1%	31.8%	20.9%	16.4%
	Material Readiness	13.6%	8.2%	20.0%	26.4%	15.5%	16.4%
	Contracting	16.4%	10.0%	20.0%	30.0%	15.5%	8.2%
	Deployment Strategy	11.8%	8.2%	10.0%	20.9%	22.7%	26.4%
	In-Transit Visibility/Asset Visibility	8.2%	10.9%	13.6%	22.7%	24.5%	20.0%
Distribution	Transportation Mode Selection	12.7%	9.1%	21.8%	22.7%	20.0%	13.6%
	Distribution Portfolio Management	19.1%	10.0%	20.0%	22.7%	20.0%	8.2%
Life Cycle Logistics	Acquisition Logistics Certification	24.5%					
	Program Management Certification	18.2%					

Notes: n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n =111 for Lt Col, n = 35 for Col; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Values for Life Cycle Logistics are "Yes" answers

		Lt Col					
Competency	**Sub-competency**	**N/A**	**B**	**I**	**P**	**S**	**A**
Supply	Supplier Relationship Management	18.9%	12.6%	9.9%	25.2%	18.0%	15.3%
	Sourcing & Procurement Strategy	21.6%	19.8%	8.1%	25.2%	14.4%	10.8%
	Inventory Planning	18.9%	15.3%	9.9%	27.9%	17.1%	10.8%
	Inventory Management	18.9%	14.4%	7.2%	24.3%	21.6%	13.5%
	Material Disposition	17.1%	20.7%	12.6%	25.2%	16.2%	8.1%
	Return/Retrograde	17.1%	8.1%	10.8%	21.6%	27.0%	15.3%
Transportation	Distribution Network Analysis	14.4%	10.8%	12.6%	18.9%	21.6%	21.6%
	Inbound/Outbound Transportation Management	16.2%	9.0%	10.8%	24.3%	22.5%	17.1%
	Transportation Planning	11.7%	13.5%	14.4%	17.1%	23.4%	19.8%
	Transportation Marketplace Knowledge	9.9%	13.5%	15.3%	19.8%	25.2%	16.2%
Planning	Demand Forecasting	11.7%	17.1%	12.6%	19.8%	24.3%	14.4%
	Network Optimization	11.7%	16.2%	14.4%	18.0%	23.4%	16.2%
	Requirements Planning (Deployment)	13.5%	8.1%	7.2%	18.9%	24.3%	27.9%
	Distribution Requirements Planning	12.6%	11.7%	9.9%	21.6%	20.7%	23.4%
	Adaptive Planning	7.2%	7.2%	4.5%	19.8%	26.1%	35.1%
	Sustainment Planning	10.8%	9.0%	7.2%	19.8%	22.5%	30.6%
Joint	Joint Theater Logistics	15.3%	7.2%	7.2%	18.0%	23.4%	28.8%
	Host Nation Support	19.8%	9.9%	8.1%	17.1%	23.4%	21.6%
	Coalition Operations	18.9%	8.1%	9.9%	13.5%	29.7%	19.8%
	Joint Deployment & Distribution Architecture	15.3%	7.2%	9.0%	15.3%	24.3%	28.8%
	End to End Analysis	18.0%	14.4%	11.7%	19.8%	16.2%	19.8%
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	17.1%	12.6%	9.9%	25.2%	16.2%	18.9%
	Multinational Relationship Management	18.0%	9.9%	8.1%	22.5%	19.8%	21.6%
	Service to Service Interoperability	11.7%	5.4%	9.0%	20.7%	20.7%	32.4%
Maintenance	Depot Maintenance Operations	26.1%	27.9%	13.5%	18.0%	7.2%	7.2%
	Field Maintenance Operations	26.1%	26.1%	11.7%	20.7%	9.9%	5.4%
Deployment	Movement Requirements Forecasting	14.4%	10.8%	8.1%	23.4%	24.3%	18.9%
	Material Readiness	14.4%	9.9%	13.5%	24.3%	27.9%	9.9%
	Contracting	18.9%	13.5%	16.2%	23.4%	17.1%	10.8%
	Deployment Strategy	13.5%	5.4%	7.2%	19.8%	28.8%	25.2%
	In-Transit Visibility/Asset Visibility	13.5%	8.1%	10.8%	18.0%	32.4%	17.1%
Distribution	Transportation Mode Selection	14.4%	9.0%	10.8%	28.8%	19.8%	17.1%
	Distribution Portfolio Management	18.0%	12.6%	9.9%	30.6%	20.7%	8.1%
Life Cycle Logistics	Acquisition Logistics Certification	15.3%					
	Program Management Certification	11.7%					

Notes: n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n =111 for Lt Col, n = 35 for Col; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Values for Life Cycle Logistics are "Yes" answers

		Col					
Competency	**Sub-competency**	**N/A**	**B**	**I**	**P**	**S**	**A**
Supply	Supplier Relationship Management	8.6%	11.4%	8.6%	20.0%	20.0%	31.4%
	Sourcing & Procurement Strategy	11.4%	20.0%	5.7%	22.9%	25.7%	14.3%
	Inventory Planning	8.6%	11.4%	11.4%	28.6%	11.4%	28.6%
	Inventory Management	11.4%	14.3%	8.6%	34.3%	14.3%	17.1%
	Material Disposition	14.3%	17.1%	11.4%	25.7%	17.1%	14.3%
	Return/Retrograde	11.4%	11.4%	8.6%	22.9%	22.9%	22.9%
Transportation	Distribution Network Analysis	14.3%	8.6%	11.4%	20.0%	28.6%	17.1%
	Inbound/Outbound Transportation Management	14.3%	5.7%	20.0%	22.9%	31.4%	5.7%
	Transportation Planning	14.3%	14.3%	5.7%	28.6%	28.6%	8.6%
	Transportation Marketplace Knowledge	8.6%	5.7%	11.4%	40.0%	25.7%	8.6%
Planning	Demand Forecasting	8.6%	11.4%	17.1%	25.7%	22.9%	14.3%
	Network Optimization	14.3%	8.6%	20.0%	22.9%	25.7%	8.6%
	Requirements Planning (Deployment)	14.3%	11.4%	11.4%	11.4%	28.6%	22.9%
	Distribution Requirements Planning	11.4%	5.7%	20.0%	22.9%	25.7%	14.3%
	Adaptive Planning	11.4%	2.9%	11.4%	14.3%	25.7%	34.3%
	Sustainment Planning	11.4%	5.7%	5.7%	20.0%	34.3%	22.9%
Joint	Joint Theater Logistics	14.3%	11.4%	2.9%	14.3%	28.6%	28.6%
	Host Nation Support	14.3%	17.1%	8.6%	20.0%	25.7%	14.3%
	Coalition Operations	17.1%	11.4%	17.1%	11.4%	34.3%	8.6%
	Joint Deployment & Distribution Architecture	14.3%	14.3%	5.7%	8.6%	34.3%	22.9%
	End to End Analysis	22.9%	14.3%	11.4%	8.6%	34.3%	8.6%
	Joint Capabilities Development, Budgeting & Acquisition Proficiency	17.1%	17.1%	11.4%	17.1%	31.4%	5.7%
	Multinational Relationship Management	17.1%	17.1%	8.6%	11.4%	31.4%	14.3%
	Service to Service Interoperability	11.4%	17.1%	11.4%	11.4%	22.9%	25.7%
Maintenance	Depot Maintenance Operations	14.3%	14.3%	22.9%	25.7%	14.3%	8.6%
	Field Maintenance Operations	11.4%	28.6%	14.3%	25.7%	20.0%	0.0%
Deployment	Movement Requirements Forecasting	17.1%	14.3%	11.4%	20.0%	34.3%	2.9%
	Material Readiness	14.3%	14.3%	11.4%	25.7%	25.7%	8.6%
	Contracting	14.3%	20.0%	31.4%	11.4%	17.1%	5.7%
	Deployment Strategy	20.0%	11.4%	8.6%	8.6%	31.4%	20.0%
	In-Transit Visibility/Asset Visibility	17.1%	8.6%	14.3%	17.1%	34.3%	8.6%
Distribution	Transportation Mode Selection	17.1%	11.4%	14.3%	28.6%	25.7%	2.9%
	Distribution Portfolio Management	17.1%	17.1%	14.3%	25.7%	22.9%	2.9%
Life Cycle Logistics	Acquisition Logistics Certification	11.4%					
	Program Management Certification	14.3%					

Notes: n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n =111 for Lt Col, n = 35 for Col; N/A = Not Applicable, B = Basic, I = Intermediate, P = Proficient, S = Skilled, A = Advanced; Values for Life Cycle Logistics are "Yes" answers

Appendix H. Logistics Courses

Defense Acquisition University (DAU) Courses		
CLL001 – Life Cycle Management & Sustainment Metrics	CLL022 – Title 10 Depot Maintenance Statute Overview	CLL201 – Diminishing Manufacturing Sources & Material Shortages (DMSMS) Fundamentals
CLL002 – Defense Logistics Agency Support to the Project Manager	CLL023 – Title 10 USC 2464 Core Statute Implementation	CLL202 – DMSMS Executive Overview
CLL003 – Supportability Test & Evaluation	CLL024 – Title 10 Limitations on the Performance of Depot Level Mx	CLL203 – DMSMS Essentials
CLL004 – Life Cycle Logistics for the Rest of Us	CLL025 – Depot Maintenance Interservice Support Agreements	CLL204 – DMSMS Case Studies
CLL005 – Developing a Life Cycle Sustainment Plan (LCSP)	CLL026 – Depot Maintenance Capacity Measurement	CLL205 – DMSMS for Technical Professionals
CLL006 – Depot Maintenance Partnering	CLL029 – Condition Based Maintenance Plus	CLL206 – Parts Management Executive Overview
CLL007 – Lead-free Electronics Impact on DoD Programs	CLL030 – Reliability Centered Maintenance	LOG101 – Acquisition Logistics Fundamentals
CLL008 – Designing for Supportability in DoD Systems	CLL032 – Preventing Counterfeit Parts from Entering DoD Supply System	LOG102 – Systems Sustainment Management Fundamentals
CLL011 – Performance Based Logistics (PBL) Product Support	CLL033 – Logistician's Responsibilities During Major Technical Reviews	LOG103 – Reliability, Availability & Maintainability (RAM)
CLL012 – Supportability Analysis	CLL036 – Product Support Manager (PSM)	LOG200 – Intermediate Acquisition Management Part A
CLL013 – DoD Packaging	CLL043 – Green Logistics: Planning for Sustainability	LOG201 – Intermediate Acquisition Management Part B
CLL014 – Joint Systems Integrated Support Strategies (JSISS)	CLL054 – Joint Task Force Port Opening (JTF-PO)	LOG204 – Configuration Management
CLL015 – Product Support Business Case Analysis (BCA)	CLL055 – Joint Deployment & Distribution Performance Metrics Framework	LOG206 – Intermediate Systems Sustainment Management
CLL016 – Joint Logistics	CLL057 – Level of Repair Analysis: Introduction	LOG235 – Performance Based Logistics
CLL017 – Introduction to Defense Distribution	CLL058 – Level of Repair Analysis: Theory & Principles	LOG340 – Life Cycle Product Support
CLL018 – Joint Deployment Distribution Operations Center (JDDOC)	CLL119 – Technical Refreshment Implementation Module	LOG350 – Executive Life Cycle Logistics Management
CLL019 – Technology Refreshment Planning	CLL120 – Introduction to the DoD Shelf Life Program	
CLL020 – Independent Logistics Assessments		

Source: Department of the Air Force, 2013

AFIT School of Systems and Logistics		Miscellaneous Courses
Log 040 Intro to Supply Chain Management	Log 132 Production Maintenance Management	APOC - Aerial Port Operations Course
Log 041 Intro to Continuous Process Improvement	Log 135 Systems Lifecycle Integrity Management	ALROC - Advanced Logistics Readiness Officer Course
Log 042 Enterprise Resource Planning Basics	Log 140 LRO Contingency Operations Course	CWPC – Contingency Wartime Planning Course
Log 043 Forecasting Basics	Log 141 LRO Distribution Course	DCAPES Basic Course
Log 044 Collaborative Inventory Planning	Log 142 LRO Materiel Management Course	DCAPES Advanced Course
Log 045 Strategic Sourcing Basics	Log 143 LRS Quality Assurance Evaluator Course	ESSP - Expeditionary Site Survey Planning Course
Log 047 Asset Marking & Tracking	Log 199 Introduction to Logistics (AF)	IDOC - Installation Deployment Officer Course
Log 049 Logistics Enterprise Architecture & the SCOR Model	Log 238 Critical Chain Project Management Foundational Concepts	IROC – Intermediate LRO Course
Log 050 AF Transformation: AFSO21 & eLog21	Log 262 Applied Maintenance Management Concepts	JAOPC – Joint Air Operations Planning Course
Log 099 Fundamentals of Logistics	Log 299 Combat Logistics	JOPES – Joint Operation Planning & Execution System Course
Log 103 Central Asset Management	Log 399 Strategic Logistics Management	& the Integrated Deployment System
Log 117 Process Improvement Team Member Course	Log 499 Air Force Logistics Executive Development Seminar	MAPOC - Management of Aerial Port Operations Course
Log 131 Industrial Maintenance Management		UDM – Unit Deployment Manager Course

Source: Department of the Air Force, 2013

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Appendix I. Logistics Courses with High Utility

Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
CLL001	0	2	13	18	10	4	47
CLL002	0	0	4	8	3	2	17
CLL003	0	0	1	4	1	1	7
CLL004	0	0	2	4	1	3	10
CLL005	0	0	2	4	6	0	12
CLL006	0	0	4	2	1	1	8
CLL007	0	0	0	1	0	0	1
CLL008	0	1	9	14	5	0	29
CLL011	0	0	12	14	12	3	41
CLL012	0	0	6	6	6	0	18
CLL013	0	0	1	2	1	1	5
CLL014	0	0	0	1	1	0	2
CLL015	0	0	1	5	1	1	8
CLL016	0	1	7	16	12	3	39
CLL017	0	0	0	3	1	0	4
CLL018	0	0	4	2	3	0	9
CLL019	0	0	0	1	0	0	1
CLL020	0	0	1	2	1	0	4
CLL022	0	0	1	2	1	0	4
CLL023	0	0	1	2	0	0	3
CLL024	0	0	0	2	0	0	2
CLL025	0	0	0	2	1	0	3
CLL026	0	0	1	2	0	0	3
CLL029	0	0	1	1	2	0	4
CLL030	0	0	1	1	2	1	5
CLL032	0	0	0	2	0	0	2
CLL033	0	0	0	2	0	0	2
CLL036	0	0	0	2	1	0	3
CLL043	1	0	4	4	2	1	12
CLL054	0	0	4	5	3	0	12
CLL055	0	0	0	3	2	0	5
CLL057	0	0	0	1	1	1	3
CLL058	0	0	0	1	1	0	2
CLL119	0	0	0	1	0	0	1
CLL120	0	0	0	3	0	1	4
CLL201	0	0	1	3	3	1	8
CLL202	0	0	0	1	1	0	2
CLL203	0	0	0	1	1	0	2
CLL204	0	0	0	1	1	0	2
CLL205	0	0	0	1	1	0	2
CLL206	0	0	0	1	0	0	1
LOG101	0	8	29	33	41	10	121
LOG102	0	1	14	22	28	5	70
LOG103	0	0	15	11	17	5	48

n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj,
n = 111 for Lt Col, n = 35 for Col; "Other" courses are listed separately

Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
LOG200	0	0	14	19	19	3	55
LOG201	0	0	12	20	19	4	55
LOG204	0	0	6	5	9	1	21
LOG206	0	0	6	8	7	1	22
LOG235	0	1	14	15	16	1	47
LOG340	0	0	1	4	4	1	10
LOG350	0	0	1	4	4	0	9
None	29	54	107	55	61	16	322
Other	1	7	13	13	15	4	53
Log040	2	13	39	23	16	2	95
Log041	0	6	23	13	8	1	51
Log042	1	3	9	7	3	1	24
Log043	1	1	7	8	3	0	20
Log044	1	0	5	7	3	0	16
Log045	0	0	5	6	1	2	14
Log047	0	1	9	6	4	0	20
Log049	0	3	7	10	4	1	25
Log050	1	9	12	16	8	1	47
Log099	15	46	93	41	25	8	228
Log103	1	4	7	5	2	0	19
Log117	2	4	8	6	1	0	21
Log131	0	0	1	2	1	0	4
Log132	0	0	1	3	0	0	4
Log135	0	0	2	2	0	1	5
Log140	14	59	83	28	26	2	212
Log141	17	54	84	25	23	4	207
Log142	15	49	71	27	23	3	188
Log143	2	7	4	6	3	0	22
Log199	4	23	70	65	56	17	235
Log238	0	1	0	2	1	0	4
Log262	0	0	2	2	7	0	11
Log299	4	16	61	61	50	14	206
Log399	0	0	8	23	28	17	76
Log499	0	0	1	3	4	13	21
None	2	2	16	17	26	8	71
Other	0	2	7	8	4	4	25
APOC	1	7	22	24	33	4	91
ALROC	0	1	12	52	50	4	119
CWPC	3	18	69	77	70	14	251
DCAPES Basic	1	8	33	35	26	2	105
DCAPES Advanced	0	1	3	10	1	0	15
ESSP	0	0	6	15	9	1	31
IDOC	0	13	41	7	6	2	69
IROC	0	0	29	52	32	5	118
JAOPC	0	0	2	14	13	2	31
JOPES	1	1	15	39	45	13	114
LOGMOD IDS	3	3	16	26	9	3	60
MAPOC	1	9	28	19	12	1	70
UDM	5	6	13	16	9	1	50
None	20	28	26	5	4	11	94
Other	0	4	21	6	11	2	44

n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj,
n = 111 for Lt Col, n = 35 for Col; "Other" courses are listed separately

Other
2d Lt DAU Other: CLG001, CLG005
1st Lt DAU Other: ACQ101, Contracting Officer Representative (COR), CLC206, CLC106, CLC222, & CLM003, Team Management
1st Lt AFIT Other: LOG047, SYS110
1st Lt Misc Other: PLMC, LOGFAC, Container Mgmt Course, Responsible Officer for Fuels Mgmt
Capt DAU Other: ACQ101, Netotiation, FAM103, Ethics, SYS101, CLB007, CLB016, Joint Doctrine Course in Joint Logistics, NATO Ballistic Missile Defense Orientation, CLE007, CLE004, LCL & PM Lvl 1 and 2 Courses
Capt AFIT Other: FAM103, Balanced Scorecard Basics, AFIT Master's Courses, JTF-PO SPOD, JSOTF, LOG048, Systems Courses
Capt Misc Other: BSM-E, Responsible Officer Course, DLA Energy J20 Course, DESC Overview Course, PLMC, JALIS, CMOS, CRMOC, AAMOC, Airlift Loadplanners Course, Nuclear Mgmt Executive Seminar, Nuclear Certified Equipment, Fuels Responsible Officer, NWRM Fundamentals Course, DLA-BSME RO, AF Sorts ADTA Handlers Course, Security Cooperation Mgmt, Security Cooperation Mgmt Logistics Support, AFFOR Staff Training Course, Warfighter Development Education, Combat Transportation & Resource Course
Maj DAU Other: PM Lvl 1 Courses, PM Lvl 2 Courses, ACQ Mgmt Lvl 2 Courses, LOG236, CLB007, CLB016, SYS101, ACQ201A, ACQ201B, ACQ101, Contracting in a Contingency Environment, DLA Support to the PM, Contracting Officer Representative (COR)
Maj AFIT Other: NATO Joint Log Officers Course, Leadership in SCM, LCL Lvl 2 Courses, PM Lvl 1 Courses, DISAM AO Course, J-20 Fuels Quality Assurance, LOG048, LOG046
Maj Misc Other: CMOS, PLMC, AFIT Masters Courses, ELROC, Joint Humanitarian Ops Course, Joint Course on Logistics
Lt Col DAU Other: LCL Lvl 1 Courses, ACQ101, ACQ201, CLC011, SYS101, CLC222, CLC205, CLC106, CLM003, SYS101, ACQ101, CLC046, CLG001, CLM023, RQM310
Lt Col AFIT Other: AFIT Masters Courses, ASAM, Log 260, AAMOC
Lt Col Misc Other: AFSO21 Courses, AAMOS, ELROC, JPME II, CGSC, Advanced Transportation Mgmt Course, Mathematical Optimization Modeling, Statistical Forecasting Techniques, AFCOMAC SOO, Air Ops Ctr Course, JLC
Col DAU Other: ACQ101, CLB007, CLB016, SYS101
Col AFIT Other: ASAM, Fundamentals of Supplying an EAF, LOG260, WLOG492
Col Misc Other: Advanced Supply Officer Course, RQM110

Notes: If no courses were indicated there is no row for that rank and course type

Appendix J. Logistics Courses with Potential Utility

Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
CLL001	7	17	26	19	14	4	87
CLL002	7	9	25	13	10	5	69
CLL003	2	3	3	3	2	2	15
CLL004	6	15	26	16	14	2	79
CLL005	1	7	17	8	6	1	40
CLL006	3	5	20	10	7	6	51
CLL007	0	3	3	3	1	0	10
CLL008	0	4	5	6	7	2	24
CLL011	1	5	23	8	18	3	58
CLL012	3	7	9	11	9	4	43
CLL013	5	6	8	7	4	2	32
CLL014	1	8	17	14	12	1	53
CLL015	0	3	4	6	7	3	23
CLL016	12	27	65	35	33	6	178
CLL017	4	11	33	15	17	6	86
CLL018	9	16	40	25	29	8	127
CLL019	1	3	3	4	2	2	15
CLL020	1	6	16	11	10	3	47
CLL022	1	4	14	6	9	4	38
CLL023	0	4	8	5	6	3	26
CLL024	1	3	13	4	5	4	30
CLL025	2	4	13	8	6	1	34
CLL026	1	5	13	7	8	3	37
CLL029	0	5	5	2	5	2	19
CLL030	0	4	6	4	6	2	22
CLL032	3	3	6	5	7	3	27
CLL033	3	8	10	7	8	3	39
CLL036	1	4	3	3	8	3	22
CLL043	4	18	24	12	9	3	70
CLL054	8	11	34	19	14	4	90
CLL055	5	8	28	15	19	3	78
CLL057	1	7	10	6	8	1	33
CLL058	0	7	8	6	8	2	31
CLL119	0	3	2	3	1	0	9
CLL120	3	7	15	10	8	2	45
CLL201	3	5	8	5	11	5	37
CLL202	0	3	7	2	9	3	24
CLL203	0	3	4	4	5	2	18
CLL204	0	3	7	4	3	2	19
CLL205	0	3	2	2	2	2	11
CLL206	0	3	10	6	6	6	31
LOG101	5	19	26	15	16	4	85
LOG102	1	9	16	11	11	2	50
LOG103	4	13	10	12	7	1	47

n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n = 111 for Lt Col, n = 35 for Col; "Other" courses are listed separately

Course	2d Lt	1st Lt	Capt	Maj	Lt Col	Col	Total
LOG200	4	10	19	13	6	3	55
LOG201	4	10	21	14	8	4	61
LOG204	0	5	9	8	4	1	27
LOG206	1	6	23	8	9	2	49
LOG235	7	16	41	27	33	9	133
LOG340	5	16	41	16	24	5	107
LOG350	3	12	32	23	31	12	113
None	10	24	46	40	29	12	161
Other	0	1	1	1	4	0	7
Log040	11	17	28	21	18	6	101
Log041	10	14	17	13	10	3	67
Log042	0	8	12	7	12	3	42
Log043	6	12	22	10	17	4	71
Log044	0	6	7	4	14	3	34
Log045	2	8	12	8	12	2	44
Log047	3	5	10	4	10	3	35
Log049	1	5	18	12	17	3	56
Log050	3	9	13	12	13	0	50
Log099	10	10	14	9	8	2	53
Log103	2	11	16	9	16	4	58
Log117	3	9	11	12	12	2	49
Log131	0	6	12	1	6	2	27
Log132	1	4	11	5	8	2	31
Log135	3	9	18	8	6	4	48
Log140	11	8	23	15	12	5	74
Log141	7	11	20	16	9	4	67
Log142	10	13	25	18	8	4	78
Log143	6	5	17	10	11	1	50
Log199	7	25	31	9	10	4	86
Log238	2	8	22	11	17	5	65
Log262	3	8	15	8	11	0	45
Log299	11	39	64	26	26	5	171
Log399	12	31	70	49	40	9	211
Log499	5	15	35	40	56	16	167
None	3	7	22	17	18	4	71
Other	1	0	0	0	2	0	3
APOC	11	29	55	16	13	2	126
ALROC	12	35	98	25	19	5	194
CWPC	8	26	51	16	21	5	127
DCAPES Basic	9	30	51	17	18	5	130
DCAPES Advanced	5	19	41	13	9	4	91
ESSP	5	23	38	20	21	6	113
IDOC	6	30	41	17	12	3	109
IROC	13	44	58	7	5	5	132
JAOPC	5	29	59	31	22	3	149
JOPES	10	37	63	27	28	3	168
LOGMOD IDS	8	27	36	15	14	3	103
MAPOC	6	24	48	19	8	2	107
UDM	4	17	22	8	7	1	59
None	8	4	19	34	40	17	122
Other	0	0	4	1	2	0	7

n = 30 for 2d Lt, n = 68 for 1st Lt, n = 156 for Capt, n = 110 for Maj, n = 111 for Lt Col, n = 35 for Col; "Other" courses are listed separately

Other
2d Lt AFIT Other: Statistics
1st Lt DAU Other: ACQ101
Capt DAU Other: All of them
Capt Misc Other: DLA Energy J20 Course, DESC Overview Course, Load Planning, DLA Fuels Courses,
Maj DAU Other: ASAM
Maj Misc Other: Joint Log Course
Lt Col DAU Other: Joint Courses, LCL Lvl 2 Courses, Contracting Courses, Defense SCM
Lt Col AFIT Other: Certificate in SCM, Class III Bulk POL Courses
Lt Col Misc Other: Joint Courses, AAMOC

Notes: If no courses were indicated there is no row for that rank and course type

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14. ABSTRACT
The ubiquitous nature of economic uncertainty that has plagued the Department of Defense has necessitated the relentless pursuit of cost savings and efficiency improvements. Under the auspices of force development, drawing on resource-based theory, this research analyzed the impact of Logistics Readiness Officer (LRO) human capital, learning culture, and knowledge management on organizational performance as a means to increase competitive advantage. Survey methodology was utilized to garner data with both theoretical and practical implications on LRO force development practices. Solicitation of information regarding LRO competencies, the utility of logistics courses, and the latent construct was conducted via a web-based self-reporting cross-sectional survey. Data were collected from 617 LROs out of a possible 1,411, yielding a 43.7% response rate. Examination of the latent variable data using multivariate regression supported all three hypotheses, revealing that investment in LRO human capital, learning culture, and knowledge management have positive impacts on organizational performance. Practical application of the theoretical findings could yield potential cost savings of between $6K and $60K per course per annum by consolidating or restructuring each logistics course identified as having low utility. Implications for researchers and practitioners are discussed along with limitations, recommendations, and areas for future research.

15. SUBJECT TERMS
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